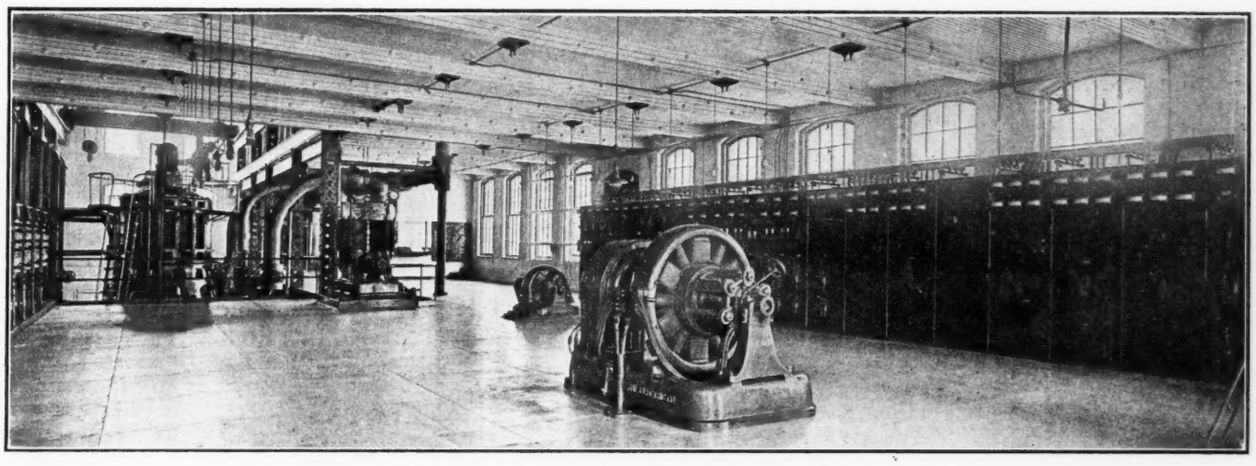
Municipal Journal

Volume XXXV. NEW YORK, AUGUST 7, 1913. No. 6



WEST END OF OPERATING FLOOR, HOLYOKE ELECTRIC PLANT.
Showing switchboards, exciter sets and turbines. 30 kw. motor for coal handling machinery in middle background.

HOLYOKE MUNICIPAL GAS AND ELECTRIC WORKS

Ten Years of Municipal Ownership of Electric and Gas Plants.—Electric Output Increased Ten Fold.—Rates Greatly Reduced.—Plants Doubled in Value.—History of Development.—Mechanical Equipment.

There are very few municipal gas works in this country, and one of the most successful of these is that of Holyoke, Mass. In addition that city operates an electric plant, using both water power and steam turbines. In ten years the output of electricity has increased ten fold and that of gas more than doubled. In spite of the fact that the price of current has been reduced to one-third of that charged at the beginning of municipal control, and the price of gas to three-fourths the original price, the plant has paid over $914,000 out of its earnings in additions and payment of purchase bonds.. It may therefore be classed as one of the best illustrations of admirable municipal operation.

The city of Holyoke purchased the gas and electric plants from the Holyoke Water Power Company, receiving possession Dec. 15, 1902, and the history of the municipal plant therefore covers ten and a half years. At the time of purchase the gas works were in fair condition as to buildings, apparatus and street mains. The buildings containing the electrical equipment were in good condition but the equipment itself was obsolete and overloaded, the poles of the distributing lines were badly decayed, the wire insulation badly impaired and all overloaded. With the plant the city secured the right to water for power to the extent of sixteen "mill powers," with four 250 h.p. water wheels for using the same.

The generating capacity of the gas works was 1,100,000 cu. ft. per twenty-four hours, but the purifying capacity was only 500,000 cu. ft., and the storage capacity of the holders was only about 247,000 cu. ft. while the daily distribution was about double that. The gas works consisted of retort house containing ten benches of 6 retorts each for making 500,000 cu. ft. of coal gas per day; two vertical 100 h.p. Manning boilers; water gas building containing apparatus capable of making 600,000 cu. ft. of water gas per day; coal shed capable of storing 1,700 tons of coal; exhausters, condensers and purifiers in another building; pipe shop, meter room and storage in a fifth building; together with three gasometers, three oil tanks, five tar wells and two storage sheds. There were 32.35 miles of street mains and 3,937 meters set.

The electric station consisted of a boiler house, engine room, dynamo or generator building and a wheel house covering the wheel pit. The first named contained five upright 165 h.p. Manning boilers, with space for nine more. The engine room contained two 400 h.p. simple single cylinder engines, with room for two more, but these were uneconomical, intended only for use when the water power failed. In the dynamo room were twenty-five small dynamos of various kinds and capacities, some for street arcs, some for commercial arcs, others for incandescent lights and one for power. At the time of transfer 273 customers were using electricity, 72 miles of wire were strung on 1,298 poles, and there were 8 transformers in use.

For this plant the city paid $815,458, and $5,123 for supplies on hand. During the first 11½ months it spent

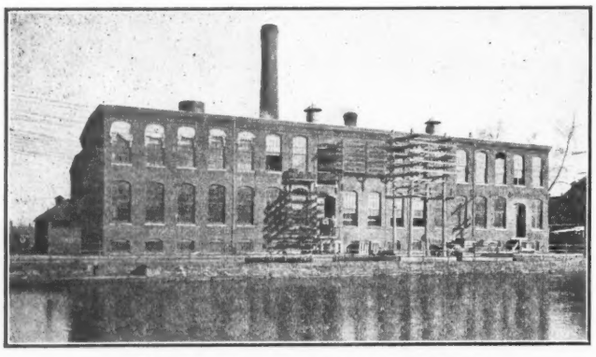
$56,531 in additions and extensions and $13,140 in renewals. Ten years later, Nov. 30, 1912, the plants were figured as worth $1,493,778 after full allowance had been made for depreciation.

The gas works were valued at $671,643, and the electric plant at $822,135. During the first year the income was $207,666; during the tenth, $483,490. The gas income increased from $143,410 to $189,019; the electricity income from $64,257 to $294,472. The growth by years is shown by the following table:

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912
Gas income	$143,410	$144,903	$153,221	$160,203	$157,677	$177,285	$178,354	$176,374	$183,692	$189,019
Gas expenses	124,124	134,942	141,676	138,962	147,695	158,423	160,245	144,583	155,015	157,207
Gas rate per M., net	1.35	1.20	1.20	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Electric income	64,257	95,310	110,701	135,746	157,167	146,329	191,717	235,173	252,909	294,472
Electric expenses	76,383	84,142	100,017	96,717	112,218	134,226	166,172	172,799	211,307	248,909
Elec. rate per kw. h., net.	18cts.	10cts.	10cts.	10cts.	10cts	6cts.	6cts.	6cts.	6cts.	6cts.
Electric rate, street arcs.	$100	$90	$90	$80	$60	$60	$60	$60	$45	$45

The amount of gas sent out has increased from 99,634,400 cu. ft. in 1903 to 213,041,800 in 1912. The amount of electricity from 1,286,890 kw. h. in 1903 to 12,729,250 in 1912. The capacity of the electric station has increased from 500 h.p. to 9,000 h.p.

During that time $383,388 of bonds were paid out of the earnings and $530,720 was paid for additions to the plants, a total of $914,108 of earnings put into the plants; in spite of the reduction in price of gas of 26 per cent, of electricity of 66 2/3 per cent, and of street arcs of 55 per cent. During 1910 the department gave to the Board of Public Works 143,354 gallons of tar for use upon the



FRONT VIEW OF MAIN BUILDING.

city's roads, 96,250 gallons in 1911 and 49,600 in 1912. No money or credit was received for this, which it estimates as worth 6 cts. a gallon.

The mechanical changes in both plants have been most vital. At the outset it was decided to discard all the electrical machinery and install, in place of the 25 small dynamos, two large ones that would economically develop electrically all the power furnished by the water wheels, and two 350 kw. a. c. generators were purchased the first year. At the same time the street lamps were changed from open to enclosed arc. The next year a 450 kw. generator was purchased, and at the end of that year a 500 kw. steam turbine generator—then a novelty. About the same time three 300 h.p. boilers were added, practically doubling the capacity of the steam plant. In spite of this addition, by the end of the third year 80 per cent of the combined water and steam power was being used when day and night loads lapped, from sunset until 6.30; and all of the steam power if the water was shut off for any cause. Therefore in the fourth year a 1,000 kw. turbo-generator was installed and three new boilers contracted for, giving the station a rated steam capacity of 3,000 h.p., with a possible overload of 1,000 h.p., and 1,000 h.p. of water power, which latter was, however, liable to interruption. No considerable additions were made during the fifth year, but during the sixth (1908) there were added one 2,500 kw. turbo-generator with the necessary condensing apparatus, four 400 h.p. B. & W. boilers with Murphy stokers and the fans, flues and stack for induced draft; followed shortly after by installing of coal and ash handling apparatus. Little was done in 1909 except to complete the work of 1908; but in 1910 four 400 h.p. boilers and a 2,500 kw. turbo-generator were installed. No new electrical machinery was added in 1911 or 1912. In 1911 a start was made towards putting the wires underground in the heart of the city.

No considerable changes were made in the gas works the first year, but the second two benches of retorts were rebuilt, the floor of the retort house relaid, the water gas apparatus relined, roofs of buildings repaired, wash room, lockers, shower bath, etc., provided; a shavings scrubber installed, a new drum put into the station meter. During the third year the old exhauster was replaced with one double its capacity, a new Sturtevant blower was added, a new gas holder was built and a boiler house containing a 75 h.p. boiler to furnish steam to prevent the water in the holder tank and cups from freezing. The following year an exhauster and motor was put in to force the gas into the new holder, which had greater weight than the older ones. In 1907 the capacity of the water gas plant was doubled, and in 1908 a turbine engine and blower for the water gas sets were installed. In 1909 four new purifiers were added. In 1910 it was found more economical to manufacture a larger proportion of water gas, and the production of coal gas was cut down to the point where it would furnish only coke enough for the needs of making water gas. During the past year a new gas retort house has been built and is now nearing completion.

During 1912 201,271,100 cu. ft. of gas were distributed, 7,897 tons of coal carbonized, 542,437 gallons of gas oil used. As a byproduct 284,292 bushels of coke and 118,455 gallons of tar were made. The employes of the gas works were a superintendent, 4 inspectors, a clerk, 2 meter and complaint men, 4 works foremen, 2 street foremen, 20 stokers, 2 water gas makers, 2 water gas helpers, 3 firemen, 2 street men. The expenses of the year were as follows:

Gas Working Expenses.

Coal	$29,954.08	
Coke used in manufacture of water gas	1,044.00	
Oil	25,593.57	
Supplies	3,749.47	
Repairs	17,940.12	
Water power rental	746.92	
Payroll	42,841.21	
Office expense	1,790.75	
Insurance	174.91	
Miscellaneous	549.54	
		$124,384.57
Bad debts	$324.08	
Interest	15,976.62	
Depreciation	16,522.00	
	32,822.70	
		$157,207.27
Profit		$31,811.50

The electric plant sent out 10,406,760 kw. (351,640 more were generated) to 2,764 customers and 490 street

arcs and 176 street incandescents. Of coal 14,114 tons were used costing $57,264, and $16,224 was paid as rental for water power. The employes of the electrical works were a superintendent, a clerk, a foreman, 5 engineers, 4 oilers, 5 firemen, 4 switchboard men, 7 trimmers, 13 line and repair men, 3 laborers, 2 machinists and an electrician. The expenses of the year were as follows:

Electric Working Expense.

Coal	$74,668.95	
Oil and waste	805.63	
Supplies	13,456.77	
Repairs	34,751.99	
Water power rental	18,717.20	
Payroll	42,708.81	
Office expense	1,790.75	
Insurance	920.16	
Miscellaneous	906.31	
		$188,726.57
Interest	$21,164.93	
Depreciation	38,952.00	
Bad debts	65.12	
		60,182.05
		$248,908.62
Profit		$45,563.07

DESCRIPTION OF PLANTS AS NOW OPERATED.

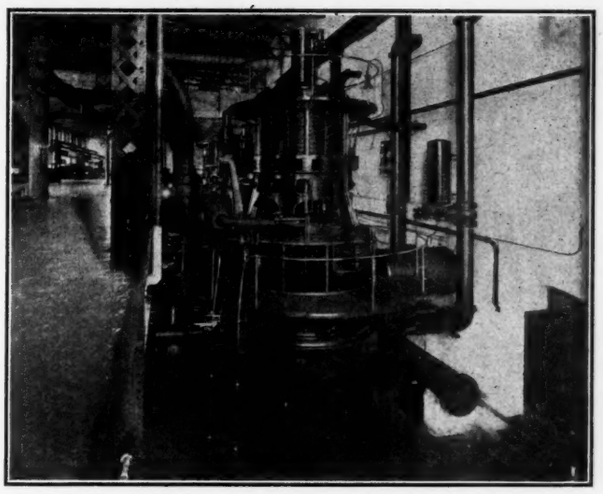
The following is a description of the electric works as now being operated:

The works are located on the hydraulic canal not far from the center of the city. The main building measures 145 feet on the canal side by 105 on the street. A wall running the long way near the middle of the building divides the generator from the boiler room. There is also a coal pocket 75 feet by 40 feet. The main building is 39 feet high from the floor to the rafters.

The generating plant consists of two 350 kw. a. c. hydraulic generators; one 1,000 kw. a. c. Curtis turbine generating unit; two 2,500 kw. a. c. Curtis turbine generating units; one 35 kw. Curtis turbo-exciter; one 60 kw. motor driven exciter; one 30 kw. belted generator for operating coal handling machines.

The condensing equipment consists of three outfits, one for each Curtis turbine, as follows: No. 1, Worthington barometric condenser, one Worthington pump, 7,000 gallons per minute capacity, direct connected to a Blake vertical compound engine. No. 2. Barometric condenser; Dean duplex pump 1,500 gallons per minute capacity. No. 3. Worthington barometric condenser; high speed centrifugal pump, 7,000 gallons per minute capacity, direct connected to Terry 120 h.p. steam turbine.

The boiler feed pumps are: Dean duplex compounded with steam end; a small Dean duplex for light loads;



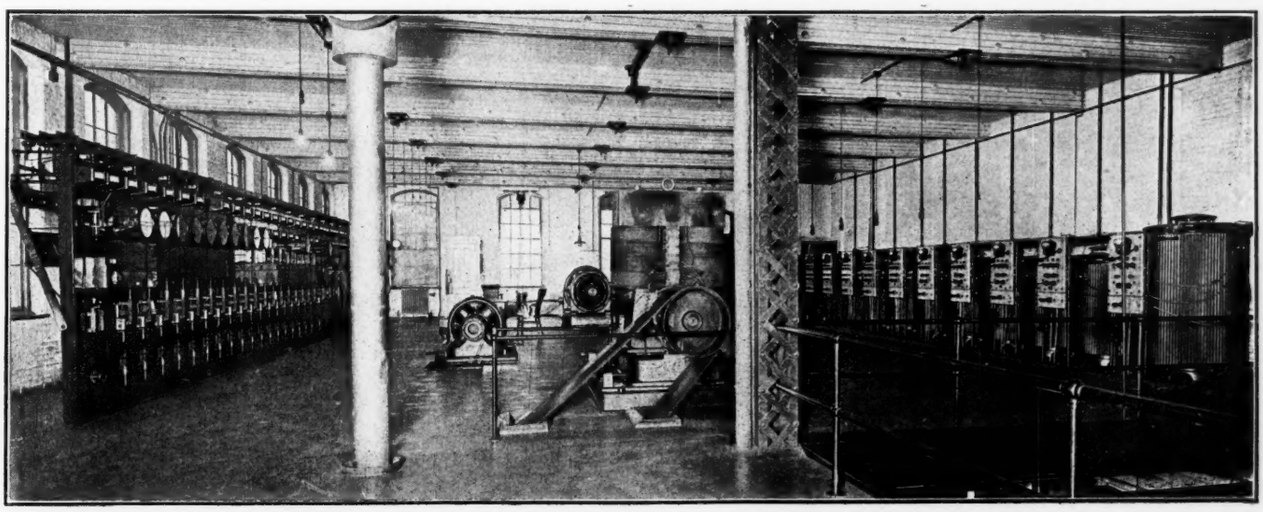
VIEW OF OPERATING FLOOR FROM WEST END.
Showing turbines, main switchboard in left background.

Worthington 3-stage centrifugal pump direct connected to Terry turbine, large enough to feed entire battery of boilers. The draft is induced by means of two 12-foot Sturtevant fans direct connected to Sturtevant horizontal center crank engines.

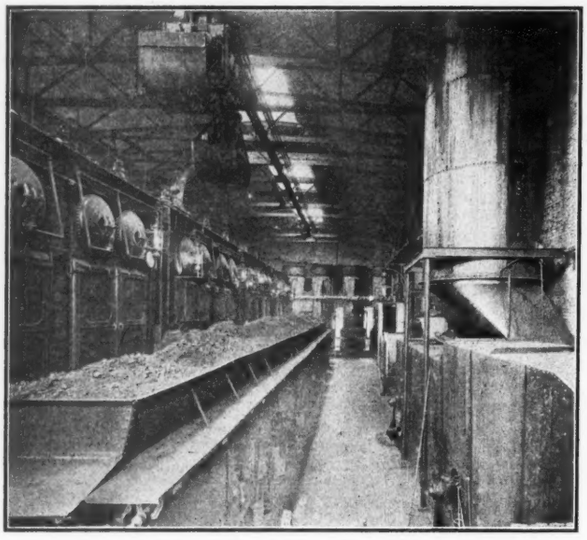
The boiler equipment consists of eight 400 h.p. Babcock & Wilcox horizontal tubular boilers and six 300 h.p. Manning vertical boilers. The B. & W. boilers are all equipped with Murphy automatic stokers.

Coal is all handled by machinery. It is unloaded from cars by a scraper conveyor. After running through a crusher, a bucket elevator discharges it into a storage bin. From the bin it is reclaimed by separate motor driven I-beam hoists and placed directly in bunkers over the stokers. The ashes are all taken from the bottom, dumped into a pit and from there carried by travelling hoist to an ash hopper, from which they are dumped into carts for removal.

The main switchboard consists of 21 panels, including a panel for distribution of commercial lighting, 3-phase power lines, arc service, generating panels, as well as panels for exciter sets and Tirrell regulating panels. All of this is standard General Electric equipment. All current is measured at this point, both generated and outgoing. There are also ten 30 kw. tub transformers and one 50 kw., each with its switchboard, for control of street lighting, both arc and incandescent.



EAST END OF OPERATING ROOM, HOLYOKE ELECTRIC PLANT.
Showing switchboards, exciter sets and D. C. power generator (which has since been removed).



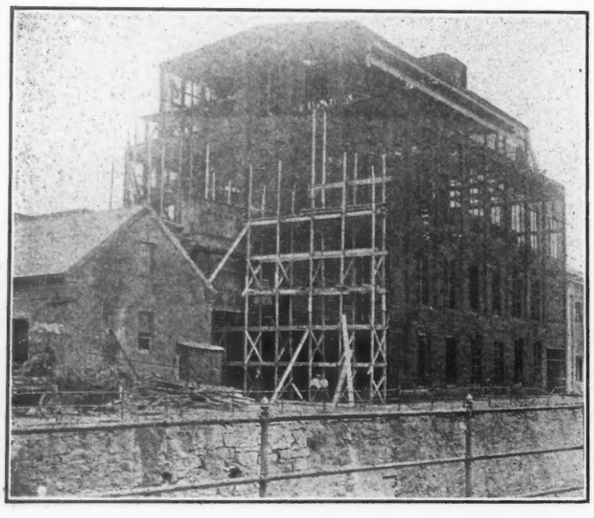
BOILER ROOM.

Eight 400 h. p. B. & W. boilers, with Murphy stokers. Eight Manning boilers at far end. Two 12" fans for induced draft on the right. Overhead runway equipped with A. C Northern Engineering Works grab bucket hoist.

The second floor of the main building contains the office of the superintendent, laboratory for meter testing, lamp repairs, etc.; also storage for incandescent lamps and supplies used in distribution of current.

Improvements are now going on in the distribution system and other changes are in contemplation in the street lighting system and the generating plant. Up to last summer all wires were overhead, but underground conduits are now being installed. J.-M. fibre conduits with the long drive joints are being laid in concrete, four to six ducts forming one conduit. About 125,000 feet of the fibre conduit have been ordered and the system so far as planned, covering the important business sections, will consist of about 25 duct-miles.

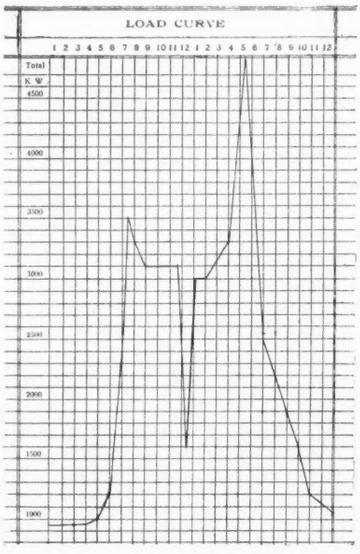
The street lighting system so far has been by enclosed arc lamps suspended from wooden poles by mast arms, and tungsten lights in the residential districts, mostly on brackets. The ornamental lighting system, up to the present limited to 5-light ornamental tungsten standards about the city hall and some lighter tungsten fixtures about the railroad station, will be greatly extended. Inverted magnetite lamps on standards will probably be used in the business streets—a new turbo-generator of the horizontal type, 4,000 kw. capacity, may be installed within a year or two.



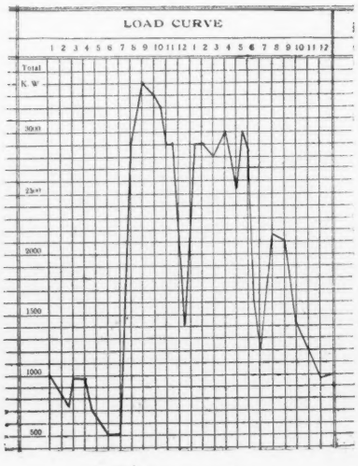
NEW COAL GAS PLANT AND BUILDING FOR HOUSING SAME.

The gas works are now undergoing extensive reconstruction with a view to reducing the price of gas to 80 cents per 1,000 cubic feet. The works up to this year have consisted of an excellent water gas apparatus and some old fashioned coal gas equipment. The coal gas apparatus has been torn out and a Woodhall-Duckham system of manufacturing coal gas is being installed by the Isbell Porter Co. of Newark, N. J. A building of skeleton steel construction (Hyrib), measuring 87 by 63 feet, 62½ feet high, covers the new generating apparatus. Only half of the building is actually being occupied with the plant of 750,000 cubic feet per day capacity, so that when necessary this equipment can be duplicated. The water gas equipment is independent and additional to this and of equal capacity. All gas now being produced is water gas, which is expensive on account of the prices at which oil has sold in recent years.

The Woodhall-Duckham apparatus, now being installed, consists of six benches of four vertical retorts each. The retorts are made of fire brick, oval in section, measuring about one foot by one and a half, inside. These retorts constitute a series of pipes or chimneys leading from a bunker above. Coal is fed into the retort from the bunker and coke is drawn by gates from the bottom when about one-third of the substance of the coal has been distilled off as gas. Four retorts are set in a rectangular brick structure, the whole forming a bench. The space between the retorts and the walls of the outer structure constitute a combustion chamber for producer gas, which is made as a part of the process for this purpose. There are furnaces on one side of the bench fed with coke, which make the producer gas.



WINTER LOAD.



SUMMER LOAD,

Note lighting load producing peak at 5.30 in winter, but only low peak at 8 in summer.

Tracing the movement of coal through the plant makes the process clearer. The coal is unloaded into a shed holding 4,600 tons, from which it is reclaimed by a Sheppard grab bucket hoist and weighed by a Richardson automatic weighing machine. By this it is delivered into a Link-belt elevator and carried to a point above the retorts. Here it falls onto a crossplate conveyor which automatically loads the four 10-ton coal bunkers, one over each bench, with its supply for eight hours. The coal travels downward through the retort

and when it is drawn out from the bottom as coke it is cold. As a matter of fact it is drawn into a wooden cart. The cart is pushed on a track to an elevator which lifts it to a bin at the top of the building. From this the coke is taken for two purposes—for fuel for the fires supplying the producer-gas to heat the retorts, and for the manufacture of water gas in the water gas plant.

After the gas is distilled much has to be done to purify it before it is put in the holders. An exhauster—a 16-inch pump—draws the gas from the retorts and passes it through a primary condenser—a series of pipes surrounded by water—where it is cooled. The tar is taken out in a P. & A. tar extracter, after which it goes through a secondary condenser, then through a Walker tar extractor. A standard scrubber removes the ammonia. There is a final process of purification in which the gas is brought into contact with porous iron oxide mixed with shavings.

Nearly all of this purifying apparatus, as well as the retorts, is new. A few words about the water gas equipment and process. It consists of one U. G. I. and one Humphries water gas outfit, 7 ft. 6 ins. and 7 ft. 4 ins. respectively. (The size refers to the diameter of the vertical iron cylinders in which the processes take place.) There are four of these cylinders to each outfit—a generator, carbureter, superheater and scrubber. In the first, steam is blown upon incandescent coke. Oil is thrown in a spray into the top of the second cylinder. In the third, additional heating and secondary chemical changes take place. A cleansing process goes on in the fourth cylinder, the scrubber. All the purifying apparatus and station meters is contained in a series of small buildings. The construction now going on, when completed, will cost between $150,000 and $200,000.

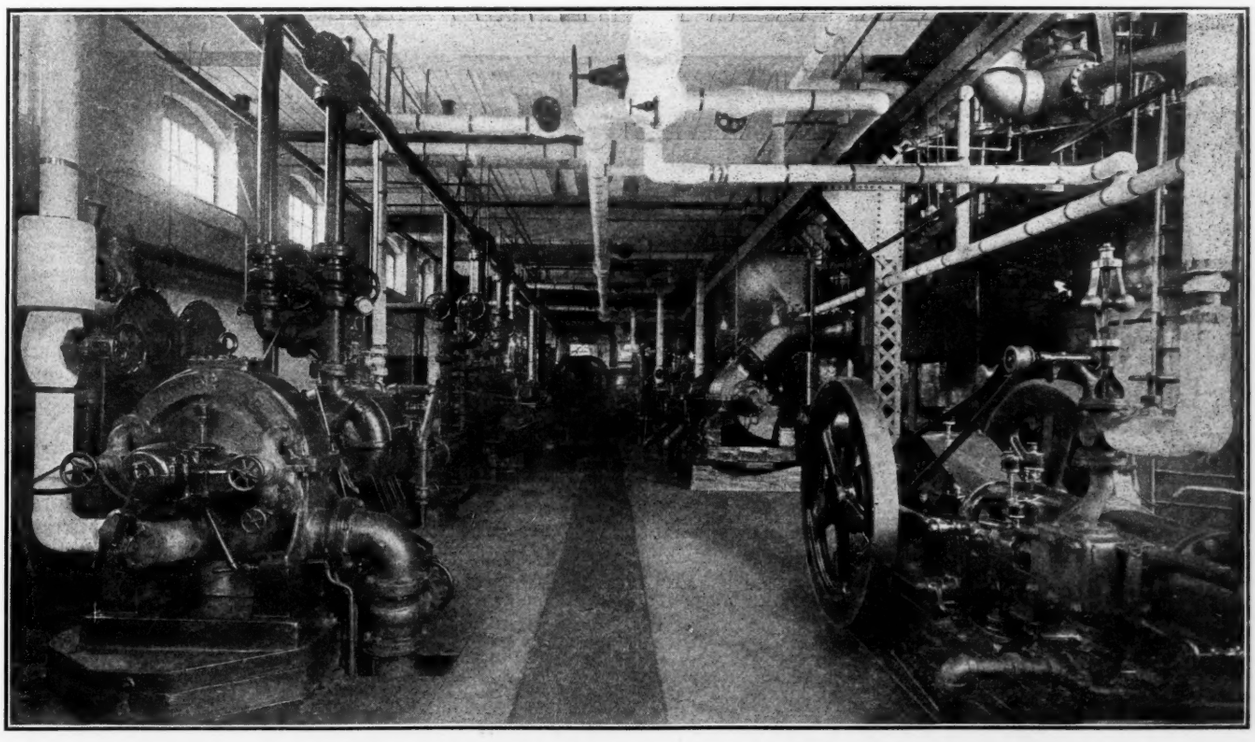
The general manager of the gas and electric department is J. J. Kirkpatrick, who has formerly occupied the positions of city engineer and also superintendent of the water department. O. W. Adams is superintendent of the gas works and A. W. Darby superintendent of the electric works.

MORE EFFICIENT INCANDESCENT LAMPS.

That the Tungsten incandescent lamp is more efficient than the carbon filament lamp and that it gives satisfaction in service are now realized by most, if not all, electric light superintendents, and this has resulted in a widespread use and rapid substitution for the older kind of lamp. The tables given in this issue illustrate this quite pronouncedly. Inventors and experimentors in this field are by no means satisfied with the results obtained, however, but are promising even greater efficiency in the near future. As the result of experiments which are being carried on continuously in the laboratories of the General Electric Company, that company has announced that it will shortly be ready to place upon the market lamps with fully twice as high an efficiency as the most efficient incandescent lamps heretofore available. The new lamps contain specially shaped tungsten filaments and are filled with inert gas, such as nitrogen, at a pressure of about one atmosphere. The types which it is expected to develop first are adapted to comparatively high current consumption, 6 amperes and above, and operate at an efficiency of half a watt per candle power.

PRIME MOVERS.

Although both have been in use for about ten years in municipal plants, many superintendents still look upon the steam turbine and the Diesel engine as experiments, at least as prime movers for lighting plants. That the former has taken a prominent place in lighting station practice is shown by the tables in this issue, where a considerable percentage of the plants are shown to be using turbo-generators, and especially by the description of the Holyoke plant. The Diesel engine formed a prominent feature of our description of the South Norwalk plant a year ago, and is now in use or being installed in sixteen other municipal plants in Arkansas, Kansas, Louisiana, Massachusetts, Minnesota, New York, Ohio, Tennessee, Texas and Wisconsin.



BASEMENT OF MAIN BUILDING, HOLYOKE ELECTRIC PLANT.
Condenser pumps on the right, boiler feed pumps on the left. In the distance, one of the 350 kw. water driven generators.

RATES FOR ELECTRIC LIGHTING

Discussion by Massachusetts Gas and Electric Light Commissioners of Proper Basis for Fixing Street Lighting Rates.

The question of charges made by private lighting companies for lighting the streets of cities is one of continuous interest and frequent dispute. The average citizen, and in many cases the superintendents of small plants, apparently think that there might be a standard price for all cities, in a given section of the country at least, as there is for coal and other standard commodities. Hardly a week passes that we do not receive inquiries concerning the charges made in cities of a given class, or direct questions as to what is a fair price for lights of a given candle power.

A truer comparison could be made of electric light rates with the prices of sand in various cities than with those of coal. The cost of the former is affected by various local conditions, and contractors and builders are aware that sand in some cities costs two to four times as much as in others. Local conditions affect the cost of lighting also; in addition to which must be considered the number and candle power of the lamps used, the schedule of lighting—whether midnight, all night, moonlight, etc., and other conditions of installation and operation. We believe we can do no better than quote from a report of the Massachusetts Board of Gas & Electric Light Commissioners, made in reply to a petition from the town of Plymouth for an order requiring the local electric light company to reduce its rates. The Commission reported in part as follows:

"It was contended, in support of the complaint, that the price charged for the incandescent lamps, taking into account prices charged in other towns of the Commonwealth, was too high; that, irrespective of prices elsewhere for 25 candle-power carbon filament lamps, the price for tungsten lamps should be less, because the latter, though of higher candle-power, consume less current than the former; and that, compared with the prices charged by the company to its other customers, the price for street lights was too high. In connection with the last proposition it was contended that the price for street lights should be based on the theoretical consumption of current by the lamp, either at the average rate charged for commercial lighting or at the average of all lighting, commercial and public, or upon the same schedule as commercial lighting, all the street lamps being regarded as the installation of a single commercial customer with an annual bill. On the other hand, the company contended that the candle-power was the true measure of the value to the town of the street lights, and a proper basis for the price. Neither party relied on any attempt to separate the company's investment and operating costs for the street lights, and to base the price upon these with a fair return upon such portion of its investment.

"While evidence of prices charged in other communities for street lights is not without weight, it can seldom if ever be regarded as controlling. Its force is also greatly weakened by the fact that such comparisons must usually be made with prices charged for carbon filament lamps, or originally made for such lamps and continued even where, as is now so common, tungsten lamps have been substituted; and by the further fact that, until very recently, in fixing prices for street lights no consistent, rational theory has been followed, either by the companies or by the public authorities, save a purpose on both sides to make the best trade possible. Whatever force may have formerly attached to the candle-power as an arbiter of rates, it must under present business methods and the development of the art be supplanted by a consideration of the energy supplied.

"It must be conceded that, based upon cost alone, street lamps of the tungsten type and of the same or even of a somewhat higher candle-power can be supplied at a less price than the carbon filament lamps, until recently exclusively used, because of their lower cost to maintain and operate; but it is by no means clear that such reduction in cost is proportional to the difference in the amount of energy consumed in the lamp. Neither those investment, distribution and management costs which necessarily enter into and constitute a substantial share of the total, nor, for that matter, certain of the costs of producing the electricity, seem to be in any degree reduced by the substitution of tungsten for carbon filament lamps. Coal and possibly repairs and maintenance, with some minor supplies at the station, appear to be the only items of street lighting cost of which it may be safely claimed that they vary according to the quantities of energy made and used. The actual saving of the company in these items, due to the less amount of energy required for the tungsten as compared with the carbon street lamps in Plymouth, based upon the figures of the fiscal year ending June 30, 1910, appeared to be somewhat less than $1 a year for each lamp, although the reduction in energy used in the lamp is more than 40 per cent. Indeed, the tendency of the introduction of tungsten lamps for both commercial and street lighting purposes is to increase the cost per unit, because of a reduction in the total units sold without any reduction in costs outside the generating station—a tendency which obviously can be checked and overcome to a large extent on the other hand by the general development of the business and by other factors of importance. However, unless the prices charged or offered for carbon filament lamps are assumed to be reasonable, the inquiry as to the amount of reduction justified by the substitution of tungstens offers no real solution to the problem as to what price the town should in fairness pay.

"The propostion that the price of street light should be based strictly upon the amount of energy required to operate the lamps, and should be made upon the same or as advantageous terms as are offered to private consumers is more fundamental.

"The board was unable to agree with the contention that the current used in all of the lamps should be combined and treated as the energy supplied to a single consumer; in other words, that all the lamps should be taken together and considered as a single installation of a large consumer. It is quite true that the billing and collection costs are minimized under the conditions of street lighting supply and become those of a single customer, but the numerous and widely scattered installations, and the investment and maintenance charges incident thereto, which constitute by far the more important items of cost, give to each lamp or group of lamps many of the characteristics of an individual customer of small size, if the commercial scale of charging is to be applied.

"If the rule were to be generally adopted of charging for these lights merely in proportion to the current used, the price for a lamp of relatively low candle-power and high wattage, like the carbon filament lamps in common use until recently in Plymouth, would be very much greater than for the relatively higher candle-power and low wattage tungsten lamps, although the latter are clearly of greater value to the public. It is equally clear that this method of charging would make the price for all night lighting approximately double that for midnight lighting, a principle which no company has yet attempted

to impose, and one which municipalities, it is safe to say, would be absolutely unwilling to adopt. Prosperous and well-managed companies have found all-night lighting profitable upon a wholly different basis, and municipalities have long been accustomed to pay proportionately less for all-night than for midnight lighting.

"Street lighting may fairly be required to bear its reasonable proportion of all necessary costs, sharing such losses as may be unavoidably incident to the business as a whole, but its fair price is not necessarily determined upon the commercial rates, especially if these for any cause happen to be unreasonably low or high, nor upon special claims distinct from those of the entire volume of the business. The methods of determining public and private lighting prices in any case must be directed to a single end, namely to determine what is a fair price, taking into consideration all the facts and circumstances involved in the case; but prices no more than dividends are governed by arbitrary or inflexible rule, nor are they wholly exempt from those business conditions and necessities which are dominant in every company."

As bearing upon this particular case the commission called attention to the fact that the company had paid but two dividends in 26 years, amounting in all to 3 per cent. On the basis of the principles stated the board recommended rates varying from $16 a year for 50-watt 40 candle-power tungsten lamps burning until midnight to $89 for 250-watt 200 candle-power tungsten lamps (or their equivalent in clusters of five 50-watt 40-c.p. lamps) burning all night, each on moonlight schedule.

SEATTLE'S MUNICIPAL LIGHT AND POWER PLANT

Hydro-Electric Plant of Twenty Thousand Horse Power—Transmission Line Forty Miles Long—Lights Six Thousand Street Lamps and Serves Twenty-seven Thousand Customers—Earns Eight Per Cent.

By J. D. ROSS, Superintendent of Lighting.

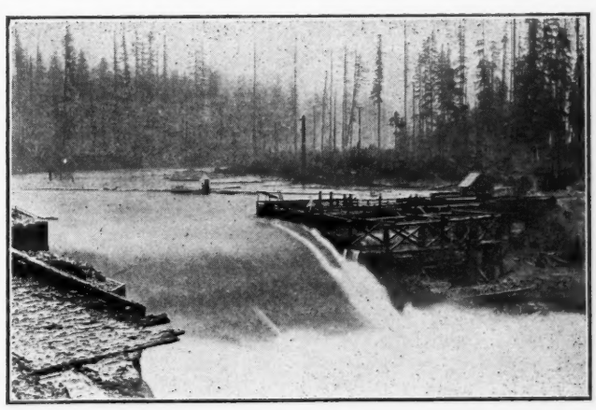
One of the most successful municipal projects in the country is the municipal power plant of Seattle. This plant was started in 1902 to supply street lights and the municipal buildings, and has grown until it serves 27,000 customers with light and power, and is earning 8 per cent. interest on an investment of over four million dollars, after providing for operation, maintenance, depreciation and interest on bonds.

The plant is a hydro-electric development with two 60,000 volt transmission lines 40 miles long. Power for the generators is derived from the waters of the Cedar River, a mountain stream which drains a water shed 79 square miles in area, located just west of the summit of the Cascade range. Rainfall on the Cedar River water-shed averages over 100 inches per year, and Cedar Lake, a body of water with an area of 2 square miles, provides an ample reservoir for storage purposes. A wood crib dam built in 1902 across the river just below the outlet of the lake diverts the water into two wood-stave penstocks, the larger of which is 69 inches, the smaller 49 inches, inside diameter. These pipes lead down along the sides of a steep canyon to the power-house, three and one-half miles distant, and 600 feet lower in elevation. The city is building a new concrete dam at a point in this canyon about midway between the present dam and the power-house, where a foundation of solid rock has been obtained. This dam will involve an investment of approximately $1,400,000, and is of the gravity type of solid "cyclopean concrete"—large boulders imbedded in concrete. This dam will raise the elevation of Cedar Lake from the original elevation of 1,530 feet to an ultimate height of 1,590 feet, and increase the power available the year round by about 200 per cent. The foundation of the dam is finished and work is being pushed rapidly with the expectation of completing the dam within the year. This dam will be over 200 feet high, 1,040 feet long and will contain about 150,000 cubic yards of concrete.

The power-house is located at the head of a small valley on the Chicago, Milwaukee and Puget Sound Railroad, at the town of Cedar Falls, which is forty miles from Seattle. The power-house building is a frame structure and contains four water-wheel generating units. The foundations for the wheels are blasted out of the solid rock. The two large wheels are 8,000 horse-power turbines of the Francis type, which were among the first used on a head as high as 600 feet. They are direct connected to Westinghouse 4,000 k.-w. 2,300 volt, 3-phase, alternators, and operate at 600 r. p. m. The smaller wheels are two Pelton wheels of 2,000 horse-power, each direct connected to Bullock 1,250 k.-w. generators. Current is transferred from 2,300 volts to 60,000 volts, 3-phase, for transmission to Seattle by nine 1,500 k.-w. Fort Wayne transformers. Remote control is used throughout the power-house and the plant is controlled from a bench-board designed by the Lighting Department, and built in its shops. This board contains a miniature of the wiring of the station with pilot lamps to show the position of each switch, so that the operator may see at a glance the connections and may control any part of the plant without moving from his position. Comfortable cottages have been built near the power-house for the employees.

The water system supply for the city of Seattle is taken from the Cedar River at a point twelve miles below the power plant, and in order to safeguard the purity of the water in every possible way, the entire water shed is either owned by the city or is to be condemned and purchased by the city. An efficient patrol system is maintained and the sewers are run from Cedar Falls to the adjoining Snoqualmie water shed.

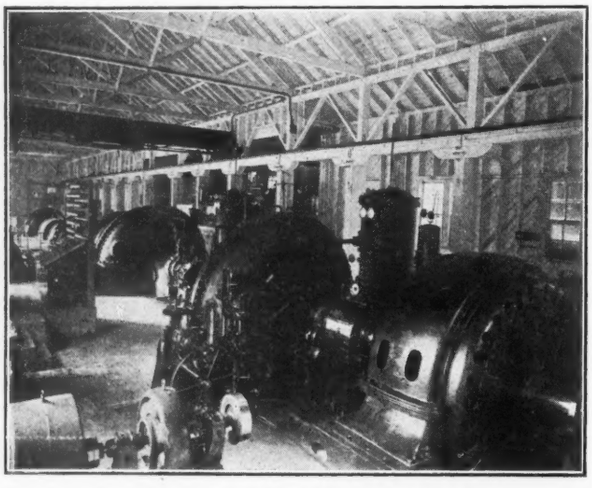
The two transmission lines from Cedar Falls to Seattle are operated in parallel. Line No. 1, built in 1902, is of No. 2 head drawn copper, and line No. 2, completed in 1908, is of 4-0 stranded copper. Both lines are set



ORIGINAL CEDAR RIVER DAM, 9 FT. OF WATER OVER SPILLWAY.

CEDAR FALLS POWER GENERATING STATION.

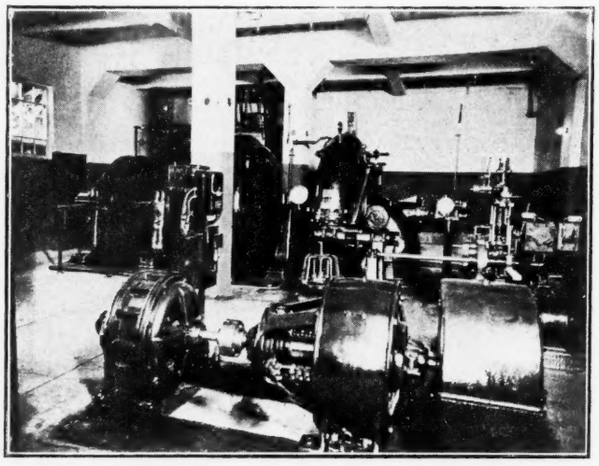
on cedar poles with triple petticoat insulators. The first line has an average span of 140 feet and the second line uses poles from 55 feet to 85 feet high with 11-inch tops, and the spacing varies from 450 to 750 feet. Three telephone lines are strung on the same poles with the transmission lines, the first of iron telephone wire, the second of 3-16-inch steel cable, and the third of No. 10 head-drawn copper. The entire right-of-way for the lines has been cleared of standing timber. The line is patrolled three times a week, patrolmen being stationed at Renton, twelve miles from Seattle, and at Landsburg, about thirty miles from Seattle.



CEDAR FALLS POWER HOUSE.
Two 8,000-HP. Turbines Under 600 ft. Head.

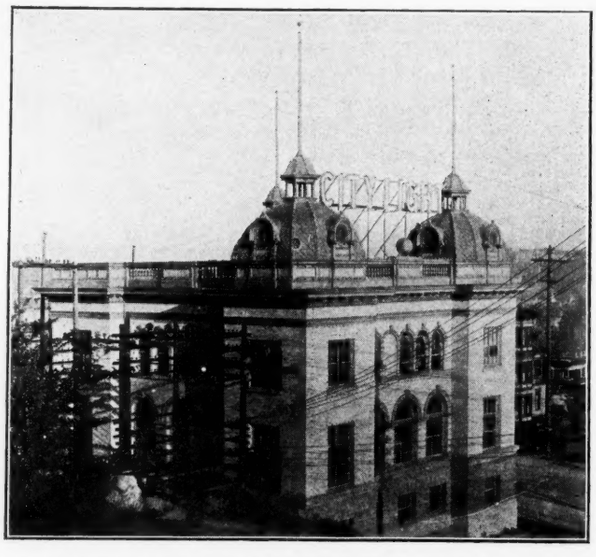
The high tension lines deliver current to the main sub-station at Seventh Avenue and Yesler Way, Seattle, for city distribution. The sub-station is a pressed brick building of pleasing architectural lines, and occupies a prominent place on the hill overlooking the business part of the district and the bay. It contains eight 1,500 k.-w. step-down transformers, similar to those at the power-house, but connected in banks of two to give 2-phase current on the secondary side. Two banks of transformers supply 2,500 volt current directly to the primary distributing system and two banks supply 15,000 volt, 2-phase current to outlying sub-stations and large power installations. There are four of these small sub-stations located at convenient distributing points throughout the city which distribute 2,500 volt, 2-phase current to all parts of the city. The current is stepped down again for customers' use by pole transformers from 2,500 volts to 125 to 250 volts service for lighting and power.

The series street lighting system of the city comprises 729 arc lamps, 5,416 32-candle power series tungsten lamps and 219 300-candle power series tungsten lamps. The business district and several of the high-class residence districts are lighted by ornamental cluster lights. These cluster lights were designed by the Seattle Lighting Department, and use a different form of pole from that generally employed. The lights are placed in the form of a triangle at right angles to the curb line. Five lamps are used to the pole, the top globe being 16-inch, the two center ones 14-inch and the two lower ones 12-



LAKE UNION AUXILIARY GENERATING STATION.
1,500 KW. Generator, 2,500 HP. Turbine Operating at 400 ft. Head from Overflow of City Water System.

inch. Fifty watt, 8 volt tungsten lamps are used, and the arrangement of lamps at right angles to the curb line rather than parallel, secures a uniform distribution of light on the side which runs from 0.45 to 0.80 foot candles, and at the same time gives a most pleasing decorative effect. There are twenty-five miles of streets lighted by cluster lights and the series lighting system covers the city so well that Seattle claims to be America's best lighted city.



CITY SUBSTATION, SEATTLE MUNICIPAL LIGHT AND POWER PLANT.
Contains 12,000 KW. Transformers, 60,000 to 2,500 Volts.

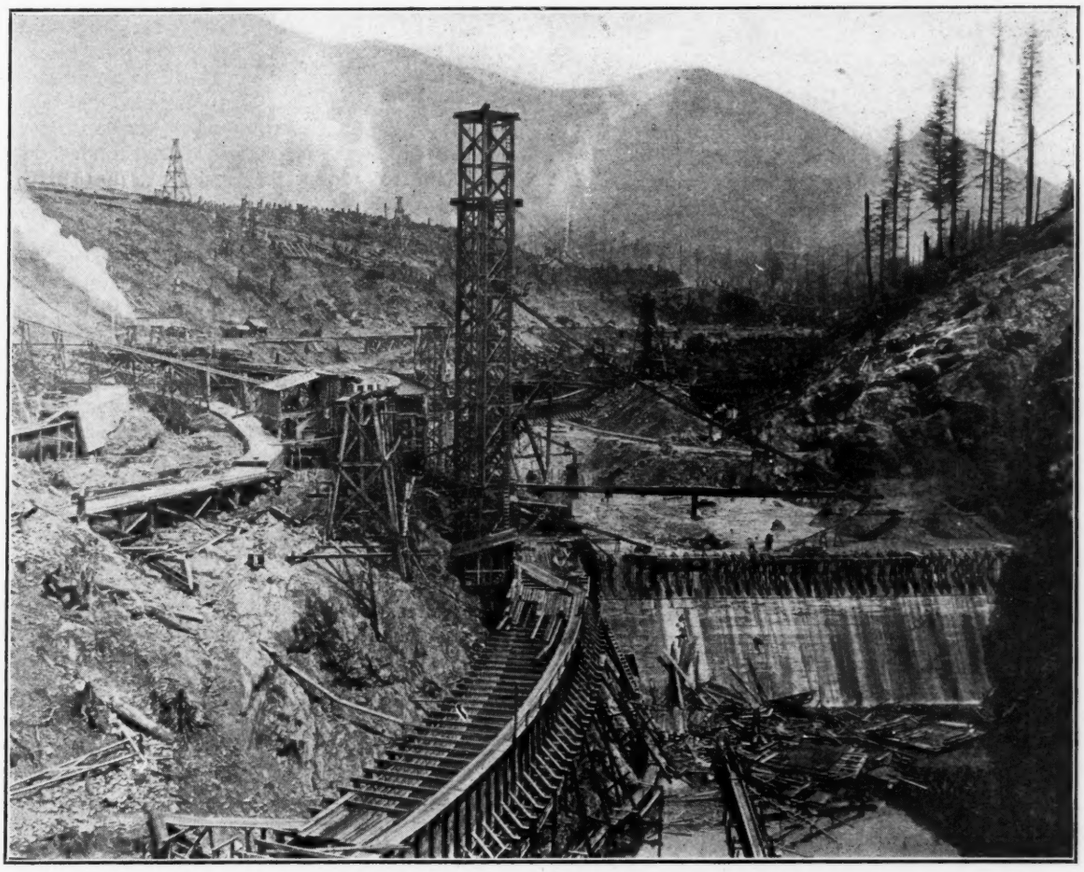
Rates for current in Seattle are especially low, the highest rate for residence lighting being 6 cents per k.-w.-h. with a minimum monthly charge of 50 cents. Since the municipal plant started, rates have been reduced by successive steps from 20 cents to 12 cents, 8 cents, and finally 6 cents per k.-w.-h. for residence lighting. Power rates are based on the hours' use of the load and the size of the motor used and run from 4 cents down to 2 cents per k.-w.-h., and a reduction of 33 per cent is given for "off-peak" current, so that the rates for power are, with the possible exception of Niagara Falls, the lowest in the United States.

The accounts in the Lighting Department are very carefully kept. Ample depreciation of the plant is figured off at the end of each year. The first two years of operation showed small deficits which were wiped out during the third year, and the end of 1912 shows a net surplus, since the plant started, of $567,842.53, which has been re-invested in extensions to the plant. The reserve depreciation at the same time was $724,461.34.

The citizens of Seattle have shown their pride in the municipal lighting plant by upholding it on every possible occasion. Repeated bond issues for extensions have been asked and always carried by large majorities. The purchase of water power sites aggregating nearly 2,000,000 horse-power has been authorized by the voters and the sites have been surveyed and their acquisition is being considered by the City Council. Bonds have also been authorized for the building of a 10,000 k.-w. steam auxiliary station within the city, and it is planned to erect this station immediately.

A 1,500 k.-w. water power station was erected last year on the shore of Lake Union, using the overflow or waste water from the city water system as the source of power. This station makes a very effective auxiliary to aid the main generating station in emergencies or times of heavy demand. During the same year a storage battery large enough to care for the entire direct-current load was installed at the sub-station, and serves to safeguard the power supply to elevator and office buildings on the city's lines.

The low rates for power, which now seem guaranteed to the citizens of Seattle for the future, have made the use of electric power general throughout the city. Electric cooking is rapidly increasing in popularity, the Lighting Department having recently sold a carload of electric stoves in a short period. Over 96 per cent of the homes in the city are wired for electric service, a greater proportion than in any other city in the country. The municipal plant is in active competition with private corporations commanding $50,000,000 capital and controlling the street railways of the entire district. How well the city's plant has succeeded against such competition may be seen from the increase in number of its customers and its earnings, as well as in the substantial reductions in rates for current.



NEW CONCRETE DAM, SEATTLE MUNICIPAL POWER PLANT.
To be 212 ft. High, 1,040 ft. Long, and Contain 150,000 cu. yds. of Concrete. Photograph, Taken June 13, Shows Foundation in Place, Concrete Tower and Chutes and Temporary Flume Carrying River Flow.

SPECIAL ILLUMINATION.

Electric illumination of public buildings as a method of celebrating holidays or ornamenting a city for special events has been growing in favor. The picture on the front cover of this issue is adapted from a photograph of the New York old city hall illuminated on the night of July 4 of this year. This photograph was taken by the New York Edison Company, to whose courtesy we are indebted for it.

ORNAMENTAL STREET LIGHTING IN LOUISVILLE

Promoted by Merchants' Association and Private Company—Provisions of Contract with Merchants—Some Construction Details.

By G. D. CRAIN. Jr.

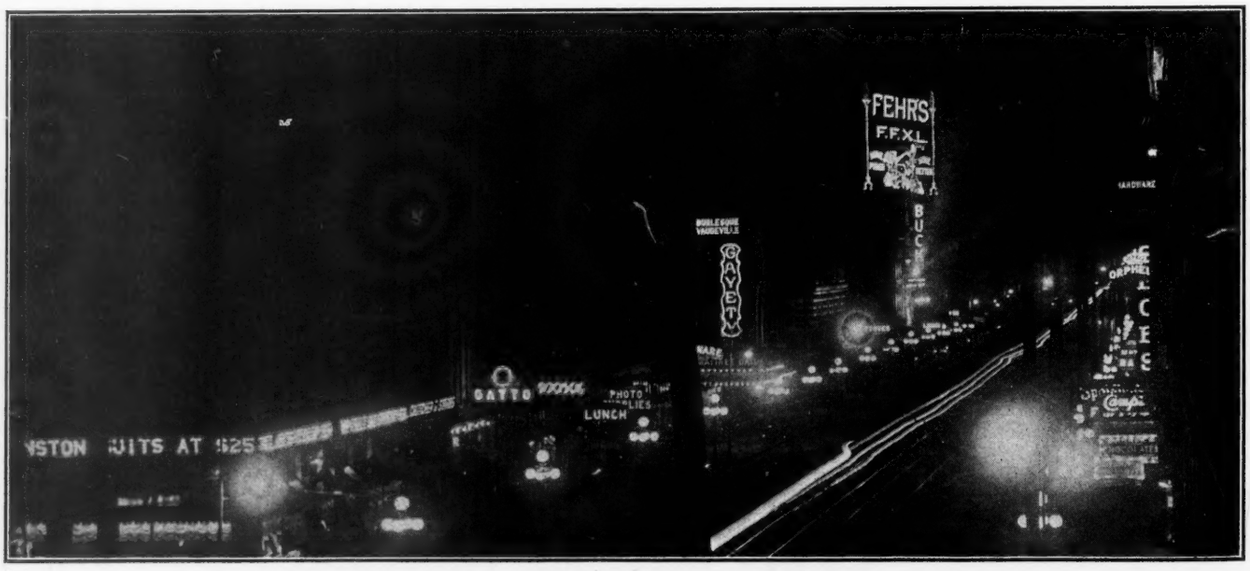
The brilliant illumination of two of the principal streets of Louisville, Ky., was brought about two years ago by the Federal Sign System Electric, the object on the part of this company being to educate merchants in the desirability of using electricity for advertising purposes. An association of merchants of Market street co-operated with this company in securing the ornamental lighting of that street, as a part of a general scheme which included better paving and other improvements to that thoroughfare. Lights on this and on Jefferson street, a parallel street, are placed 14 to the block, 7 on each side of the street. On the latter street the entire system was installed with only two men behind it, these being the owners of a large portion of the business property occupying the two blocks which are provided with brilliant lighting. The Market Street Merchants' Association appointed a committee, two of which accompanied the representative of the Federal System in canvassing the field, with the result that the merchants were practically unanimous in accepting the terms offered by the company. These terms provided for 7 standards to the block on each side of the street, each standard provided with 5 lamps; the company installing and maintaining the standards, furnishing lamps and current, for which it charged $2 a year per front foot. The standards cost between $18,000 and $20,000 for the 4 blocks on Market and Jefferson streets; the current was purchased from the local power company. One of the provisions of the contract between the company and the merchants was that failure to keep any standard illuminated would forfeit every contract on that block. This was designed to prevent any interference with the continuous maintenance of the system due to the failure of any one merchant to live up to his personal contract with the company. The contracts were signed for five years, and so far seem to have received the approval of practically all the merchants.

The standards are 13 feet high, of the "Eagle" design, manufactured in a Kentucky foundry for the Federal System. Each post or standard weighs 800 pounds—much heavier than those used in some of the private lighting systems in the city. The base is especially massive, being about 16 inches square, the post proper starting on top of this at 9 inches square and tapering to 5 inches at the top.

The manner in which the standards were set in the sidewalk is particularly interesting. The fastenings are four ½-inch bolts 6 inches long, set in extension sleeves ¾ x 4 inches. These sleeves were set at the proper points in the hole, which was first slushed with concrete, and after the mixture had hardened around the sleeves, the standards were set and the bolts screwed in, making a tight fit. This is not a very strong fastening for an 800-pound cast iron standard, but the idea was to make it easy to overturn the standard. Experience had shown that on account of the weight of these standards above the ground, it was comparatively easy for any sudden jar to break them if they did not yield and fall over; and as the damage is much greater, both to the standard and to anybody standing near, when the casting breaks into several pieces which are scattered in several directions, than when it falls in one direction intact, the method of fastening to the foundation described was used to insure that it would yield at the bottom upon receiving a severe blow.

Four globes are pendant on four arms and one is vertical, the pendant globes being 7 x 14 inches and provided with 60-watt 110-volt lamps, and the vertical globe is 8 x 16 inches carrying a 100-watt 110-volt lamp. All of the lamps are clear Mazdas, the filaments and globes of which are prevented from destruction by the jarring of the street traffic by a coil spring support, which also prevents the gradual unscrewing of the lamps in the sockets. Current is brought to the centre post of each block on each side of the street, and each side of each block is operated as a unit.

An entire block on another street, where all of the property is owned by one estate, was provided with ornamental lighting for enhancing the value of the property for business purposes, the expense being met by raising rental charges. Brilliant lighting on a smaller scale has been adopted by the principal hotels of the city also. The aim of the Federal System to educate the merchants to electric advertising has apparently been successful, as electric signs have been introduced in the city in great numbers.



LOUISVILLE ORNAMENTAL LIGHTING ON JEFFERSON STREET.

Municipal Journal

Published Weekly at
50 Union Square (Fourth Ave. and 17th St.), New York
By Municipal Journal and Engineer, Inc.
Telephone, 2805 Stuyvesant, New York
Western Office, 1620 Monadnock Block, Chicago

S. W. HUME, President
J. T. MORRIS, Manager A. PRESCOTT FOLWELL, Secretary
A. PRESCOTT FOLWELL, Editor
F. E. PUFFER, Assistant Editor

Subscription Rates
United States and possessions, Mexico, Cuba.....$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

CHANGE OF ADDRESS
Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for.
Subscribers desiring information concerning municipal matters are requested to call upon MUNICIPAL JOURNAL, which has unusual facilities for furnishing the same, and will do so gladly and without cost.

AUGUST 7, 1913.

CONTENTS

Lighting Business Districts.

The action of the merchants of Worcester, Mass., a few weeks ago in turning off the current from the various electric signs in front of their stores in order to call attention to the small contribution which the city makes towards lighting the business district, was undoubtedly successful in demonstrating this point, and the probability is that the same thing could be shown in almost any large city. New York's great "white way" which is a blaze of light would be as dark as a suburban street were it not for the signs and bright lights maintained by the merchants and advertisers of the city.

It is, however, one thing to show that the city is not maintaining many lights, but another thing to prove that it should. Without attempting to by any means exhaust the argument, we would suggest that it might be held that the duty of the city was merely to furnish sufficient light to enable traffic to use the street without danger and to render it possible for the police force to suppress disorderly or criminal conduct. Anything more than this might be considered as an attraction to the public which was in the nature of advertising and should be paid for by the merchants. We do not hold that there is not another side to the argument, but merely suggest that proving that the city does not furnish brilliant lighting in any district is not an argument that they should.

Large vs. Small Power Plants.

Illumination by electricity is less than 35 years old, but during that time the development of the art has been very great, the progress within the past twenty years having been especially remarkable. The two most important directions in which this development has proceeded are those of greatly increased efficiency and economy of production and distribution, and the greater areas over which it has become practicable to distribute from a generating station. Another very important development has been the devising, and education of the public to the adoption, of other uses of electricity, especially such as occur during the day time, when the plants would otherwise be idle. A greater diversity in the purposes for which electricty is used means an increased output for the same investment and a consequently decreased cost per unit. Many of these other uses are made possible only by greater economy of production and distribution, which economy is, as just stated, in turn furthered by such additional uses.

The vastly greater area over which it has been found possible in recent years to distribute current from a central station has resulted in a decrease in the number of generating stations, and in the practice which is becoming more and more common of a separation of the functions of generating and retail distribution of current, many cities and local private plants now purchasing current from large central plants rather than operating plants of their own. In some cases municipal power plants have been abandoned where it has been found less expensive to buy the current from some large central plant than to manufacture it, and these are sometimes pointed to as instances of failure of municipal ownership; but this is by no means the case, but rather indicates the wisdom of those in charge of the plant in recognizing the economy which can be secured and their fearlessness in making the desirable change in the face of criticism such as this which they may expect. In Massachusetts in 1888, 56 generating stations were supplying electricity for lighting 64 cities and towns; twenty-four years later 215 cities and towns were being supplied with current from less than 100 generating stations. The hydro-electric generating stations at Niagara Falls furnish electricity to points as far as 165 miles away, and one station on the Pacific coast has a transmission circuit 232 miles long.

Still another development which has increased the tendency to concentration is the use of water power in hydro-electric generating stations. While the locations where such power is available are quite numerous, especially in the mountainous sections of the country and the foothills thereof, they are by no means as numerous as the cities and towns where current is demanded. In most cases power can be generated in this way more cheaply than by coal, oil, or gas engines, and in many instances the cost of generating by water power and transmitting over considerable distances, even with the attendant costs and losses of current, is less than the cost of generating current in small individual plants.

A number of small cities and towns are using hydro-electric plants, obtaining power from comparatively small streams. In most of these cases it is found necessary, however, to install steam plants either as supplementary to the water power, or at least as a reserve in case of partial failure of such power in dry weather or during floods. In general the larger the stream the less the proportionate fluctuation or the greater the surplus water power available during average seasons, and consequently the less the necessity for auxiliary or reserve steam power; and this again works to the advantage of the large plant with a wide field of distribution as against the small local hydro-electric plants.

Those in charge of the business and mechanical policies of electric lighting plants should bear these facts in mind, and should not allow any local pride or the desire of influential parties to dispose of water power rights to influence them when there is available current from some large central plant which can be obtained at a less cost; and in figuring such cost, all items of interest, depreciation, management and other overhead charges of the local plant should not be overlooked. Of course, there are a great many cities where economical purchase of current is not practicable, but there are sections of the country where we believe most cities would find it economy to abandon their more or less antiquated plants and purchase current from large central plants, and other instances where the combination of two or three cities in operating a steam plant would prove an economy.

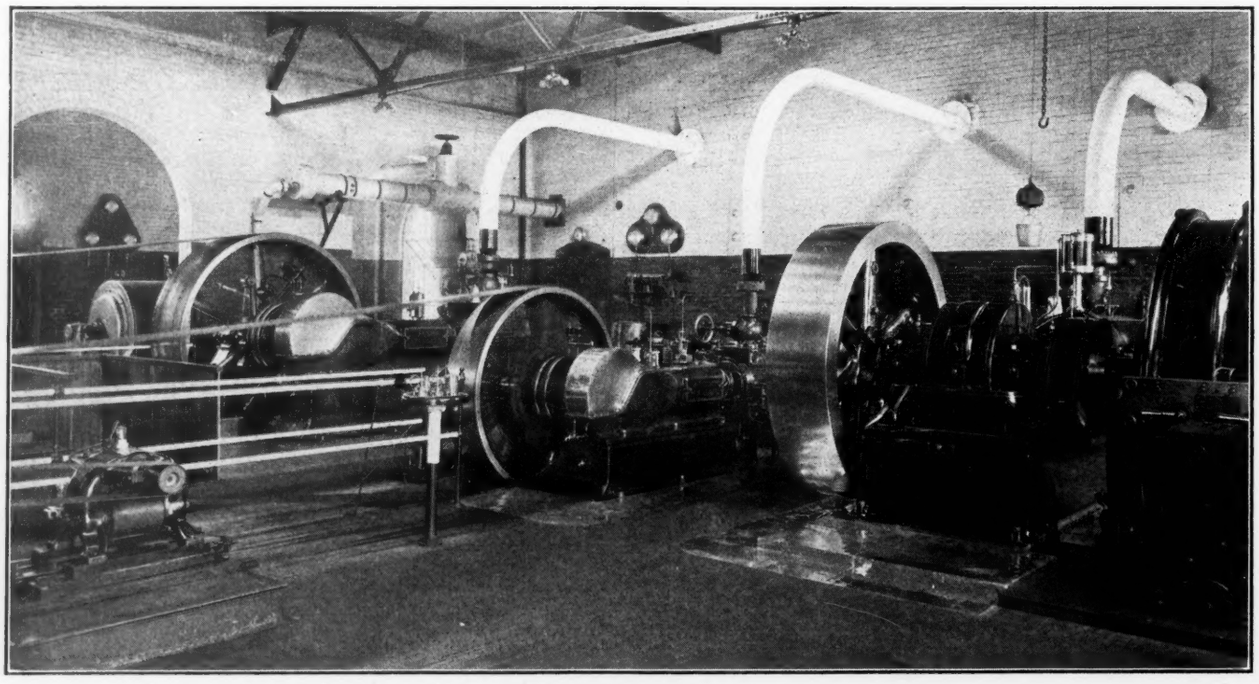
WALLINGFORD MUNICIPAL ELECTRIC WORKS

Operated by Steam and Water Power.—Successful Plant in Small City of Eleven Thousand.—Grist Mill Owned by City Operated by Surplus Water Power.—Mechanical Equipment.

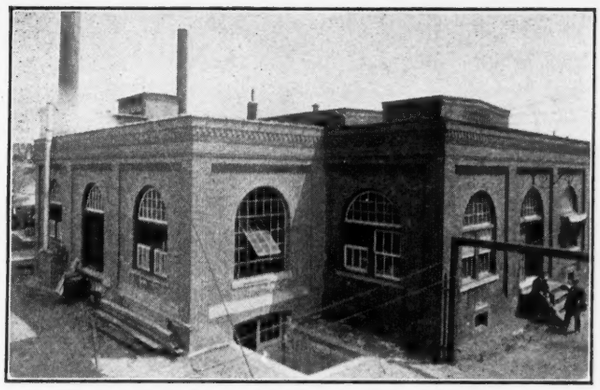
The municipal lighting plant of Wallingford, Conn., was built in 1899, the plant being started in operation on December 23d of that year and formally accepted by the borough on February 20, 1900. For several years prior to 1895, the idea of a municipal lighting plant had been advanced in public meetings and in the local press, and the general sentiment appeared to be that such a plant was necessary, especially in view of the unsatisfactory condition of the then existing lighting service and the failure of the local gas company to install an electric plant under the provisions of its charter permitting this. In February, 1895, at a special borough meeting, a vote of 339 to 12 was registered in favor of a municipal lighting plant. Under the law, another vote was necessary the year following, which resulted in 330 affirmative to 3 negative ballots. In November, 1898, a committee of 5 was appointed to investigate the probable cost of a lighting plant, which committee employed experts and presented a detailed report in January, 1899, at which time it was voted by 226 to 41 to proceed with the construction of the plant, under the direction of the Court of Burgesses, and that $45,000 of twenty-year 3½ per cent bonds be issued. A contract for the plant in accordance with the plans of the consulting engineer was let for $39,640. At its completion, A. L. Pierce was engaged as superintendent and electrical engineer to operate the plant under the direction of the Board of Electrical Commissioners. Mr. Pierce had acted as construction engineer during the construction and still retains his position as superintendent, manager and electrical engineer, and has designed and constructed all additions and extensions to the plant and system. We are indebted to him for the facts given in this description and for the photographs.

The original plant consisted of one 150 k.w. and one 75 k.w. belted Fort Wayne alternating generators, single phase; two 150 h. p. horizontal tubular boilers and Harrisburg standard side crank 4-valve engines, with pumps, condenser, heaters, switchboard, transforming devices, etc. At the end of the first year there were in operation 86 enclosed arc G. E. 6.6 ampere lamps, supplied with current by 3 G. E. constant current tub transformers, and the plant served 155 commercial customers. By the first of November, 1901, the number of commercial customers had increased to 252 and there were 5,381 lights in service. A year later a third boiler had to be installed.

During the years 1903 and 1904 the continued increasing demand for current made it evident to the commissioners that an additional generating unit must be installed before the winter of 1904. It was thought advisable to install a unit equal to the capacity of the existing plant. At the same time the proposition was consid-



GENERATOR ROOM.
In center Harrisburg engines driving Stanley generators. On right, Watertown engine direct connected to Stanley generator. At left, Curtis turbo-generator.

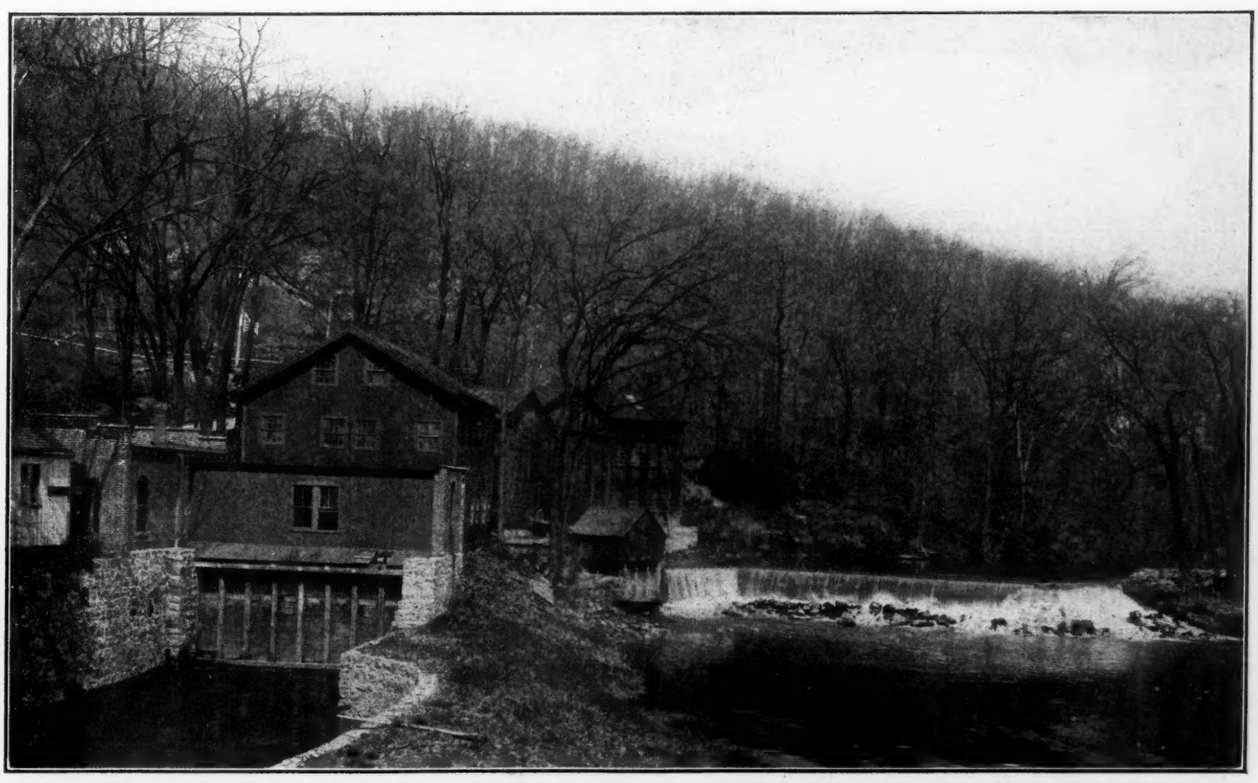


POWER HOUSE, SHOWING ADDITION FOR TURBO-GENERATOR AND BOILER.

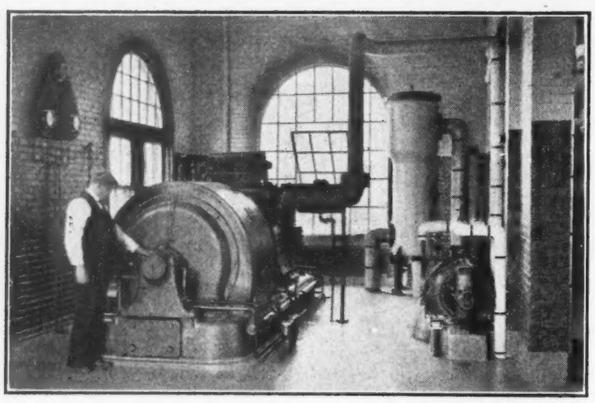
ered of purchasing a water power privilege to be used as an auxiliary to the steam plant, and in view of this possibility it was deemed advisable to install a 2-phase generator so that same could be operated in parallel; and a 240 k.w. Stanley 2-phase generator was installed, direct connected to a 4-valve Watertown engine. Early in 1905 the commissioners recommended the purchasing of a water privilege in Quinnipiac river, which was done, and in 1906 a contract for water wheels and other equipment was let to the S. Morgan Smith Company of York, Pa. The raceway was enlarged and deepened, the river straightened, a concrete floor laid from a new gate in the forebay to the wheel pit, and by the end of 1907 this plant was completed. It consists of a one-story brick fireproof building for the station proper, with a one-story brick and iron building for shafting, gears, clutches, etc., for the water wheels. This is built over a flume in which are one 51-inch Smith turbine rated at 150 horse-power and another rated at 76 horse-power when working under an 8 foot head of water (the actual working head is about 9 feet), the guaranteed efficiency of the wheels being 81.7 per cent on ¼ to ⅞ gate. Either wheel may be used alone or both at once, and the plant can be operated at the guaranteed efficiency to furnish from 35 horse-power to 226 horse-power. The main shafting is belted to a 120 kw. Stanley 2-phase generator. The switchboard at this station is connected with the switchboard at the main steam plant so that it can be operated in parallel with the 2-phase generator at the steam plant. A new switchboard was installed at the steam plant and the entire system changed from single phase to 2-phase as far as possible. (During the past year the generating system has been completely changed to 2-phase and all apparatus is now being operated in parallel.)

The grist and flour mills originally operated by the Quinnipiac water power were repaired and put in commission for operation so long as the patronage warranted it, or the power was not required for the electric plant. The 1912 report gave the total output of the steam plant for the year as 469,310 kw., and that of the water plant 285,270 kw. The Quinnipiac property cost $4,500 and $13,500 was spent in equipping it as an auxiliary station, this entire expense being paid for out of the surplus earnings.

The steam plant is located on the east bank of Community lake, from which an ample supply of water for boilers and condensing purposes is obtained. It is housed in a brick and iron building with tar and gravel roof. This is divided by partition walls into three sections, viz.: boiler room, engine room, and superintendent's office, work room, toilets, etc. The outside dimensions are 104 feet by 45 feet. At the north end of the building, directly off the boiler room, are situated the coal bunkers. The wing containing these extends from the north end of the building proper to the side hill, the top of the roof being level with the adjoining land, from which a runway extends so that coal teams can back upon the centre of the roof and dump the coal through openings into the shed below, thereby saving all shoveling and



HYDRO ELECTRIC STATION OF WALLINGFORD ELECTRIC WORKS, AND OLD GRIST AND FLOUR MILL.



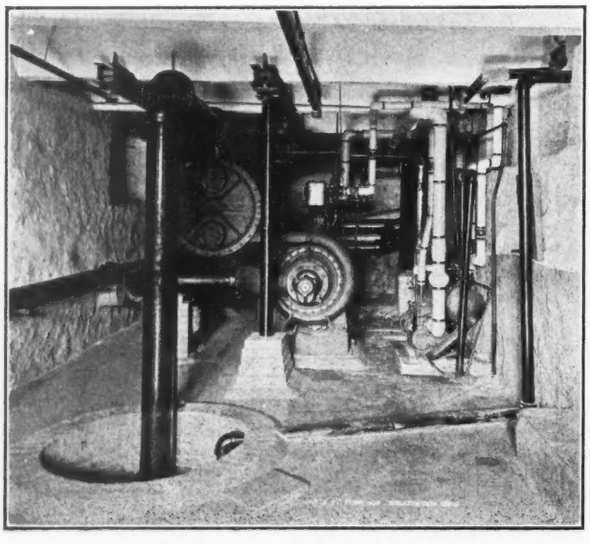
625 K. V. A. CURTIS TURBO-GENERATOR, 25 K.W. TURBO-GENERATOR EXCITER SET, 500 H.P. HEATER.

making quite a saving in the cost of cartage. There is a coal storage capacity of about 1,200 tons.

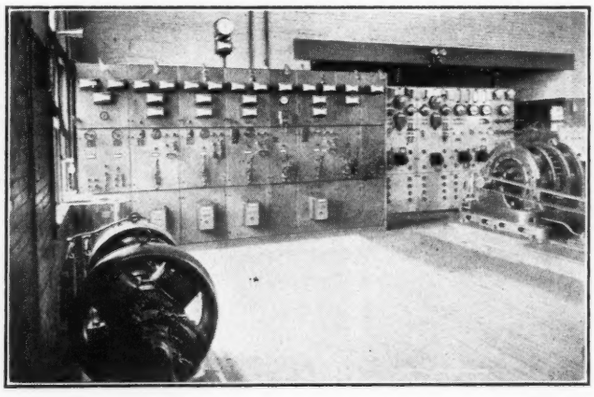
At present the plant has a boiler capacity of 700 horse-power, engine capacity of 725 horse-power, generators at the steam plant with a capacity of 950 kw., and at the water plant with a capacity of 120 kw. All the engines are arranged to be run either condensing or non-condensing. The condenser is a vertical type Warren. The feed water is heated by one main pipe in the exhaust pipe from the engines and an auxiliary heater utilizing the exhaust from the feed pump and condenser.

In the superintendent's office there are induction type recording wattmeters on each circuit going out of the power house, upon which are recorded the total amount of electricity delivered to each circuit each day. The time of starting up and shutting down, the voltage on the commercial system, any variations occurring on each circuit are also recorded during each night's run by means of Bristol recording gauges. All water used in the boiler passes through meters and all coal used is weighed. Accurate records are kept in the superintendent's log book of these figures and others, such as amount of oil and waste used, indicating wattmeter, ampere meter and voltage readings which are taken every half hour, the time of each employee, etc.

The 1912 report shows the street lamps to have been lighted every night in the year and burned a total of 3,228 hours, or approximately 8.8 hours a day. During 1911 the enclosed arc lamps which had been used for street lighting previously were replaced with tungsten lamps, which have been found to give more uniform illumination. Commercial service during the earlier years was cut off from one hour after sunrise to one hour before sunset, but since 1907 the service has been continuous for 24 hours every day. During the time that the plant has been in operation, service has been off only twenty minutes during the hours when it was supposed to be in use. The day commercial service has increased very rapidly, a large number of residents using electric flat irons and other heating and cooking utensils, electric fans, electrically operated washing machines, etc. At present about 34,000 lamps are connected, exclusive of the 600 street lights. There are 80 consumers of power and 90 miscellaneous users, in addition to the 620 residences and 216 places of business. During the past year commercial business increased 14½ per cent, and current used for power 32 per cent. The profits increased 26 per cent, and the operating costs 5.7 per cent. Farmers are beginning to use the service, one operating by electricity a complete electric laundry, including washing machines, mangle and irons; also using electric power for hoisting and stowing hay, husking corn and sawing firewood.



SURFACE CONDENSER, VACUUM PUMP AND SURGE TANK; HOT WELL IN FOREGROUND.



EXCITER AND NEW SWITCHBOARD.

During the year 38.5 per cent of all current generated was generated at the water plant at a cost of approximately 1 cent per kw. at the switchboard. The cost at the switchboard at the steam plant was approximately 4 cents per kw.

The rates are divided into six schedules: (a) for factories; (b) for places of business, churches, schools, etc.; (c) for residence lighting and power motors up to ¼ hp.; (d) long burning lamps, places of business; (e) flat rate for sign lighting on yearly contracts; (f) power of ½ hp. and over. The rate for (a) is 10 cents, plus a capacity charge of $5 per year per kw. in case of isolated plants. For (b), 10 cents for the first 100 kw. and 8 cents for the next 200. For (c), 25 per cent of the total number of lamps connected on the premises will be assumed to burn two hours each night, and this calculation will be used to determine the base rate for a maximum charge, which charge is 10 cents per kw.; all used in excess of the base rate to be charged 7 cents. (d), With lamps burning more than four nights per week and averaging five hours per night, 8 cents. (e), Two candle-power lamps, 9 cents per month; four candle-power lamps, 16 cents per month; these to burn six nights per week from one hour after sunset until 10 p. m. For (f), day power from 7 a. m. to 6 p. m. continuous during this time, 5 cents for the first 200 kw., 4 cents for the next 400, 3½ cents for the next 600 and 3 cents for all over 1,200.

In 1912 there were 10 municipal consumers on meter

and 4 on flat rate; 109 business consumers on meter and 107 on flat rate; 23 factories on meter; 530 residences on meter and 16 on flat rate; 11 churches on meter; 15 societies on meter and 4 on flat rate; 12 schools on meter; 65 power motors on meter and 9 on flat rate.

The street lamps in 1912 comprised 161 100-watt series tungsten, 33 250-watt series tungsten, 4 400-watt series tungsten and 27 400-watt series tungsten in clusters, all 6.6 ampere. There are three street lighting circuits and four commercial lighting circuits. During the year an average of 155 watts was generated per pound of coal consumed, or 6.45 pounds per kw. output. The average cost of fuel per kw. was 1.28 cents, and the average cost of manufacturing at the steam station was 4.75 cents, and at the hydraulic electric plant 0.995 cents, each including 5 per cent depreciation and 5 per cent profit on investment. During the year there were ground at the grist mill at the hydro-electric plant 87 tons of feed and 66 barrels of flour, for which there was received $402.06. The income per kw. capacity of the generating plant was $73.40, and the income per kw. capacity of the transformers in service was $82.50. The manufacturing account of the works is shown in the table.

The assets of the plant in 1912 totaled $160,218, of which the largest items were $15,996 for station and buildings, $26,245 for steam equipment, $15,120 for electrical equipment, $5,437 for Quinnipiac station and buildings, $1,583 for the electrical equipment there, and $10,956 for the water wheel equipment; $36,321 for line equipment, and $25,688 in cash and bills receivable. The liabilities consist of the original issue of $45,000 in twenty year 3½ per cent bonds and an additional issue of $10,000 in thirty-year 3½ per cent bonds, a depreciation account of $47,616, and some small items totaling $1,071. This shows a net profit of $56,532, after deducting $47,616 for depreciation. It is said that private parties have offered $260,000 for the municipal plant.

MANUFACTURING ACCOUNT OF THE WALLINGFORD ELECTRIC WORKS.

For the Year Ending July 31, 1912.

Income.		
Street lighting	$7,254.81	
Commercial lighting and power	34,091.18	
Fire alarm system	500.00	
		$41,845.99
Operating Expenses.		
Maintenance electric equipment	$90.07	
Maintenance steam equipment	1,308.94	
Maintenance line equipment	464.90	
Maintenance station and buildings	48.69	
Maintenance street lamps	323.50	
Maintenance fire alarm system	500.00	
Maintenance meters	35.87	
Fuel, operating	6,024.76	
Oil and waste, operating	296.99	
Building insurance, operating	247.24	
Boiler insurance, operating	33.36	
Liability insurance, operating	428.88	
Bond interest, operating	1,925.00	
Office rent, operating	30.00	
Expense street lamps, operating	529.65	
Expense at Quinnipiac Station	103.89	
Expense incandescent lamps	529.17	
Salaries	2,809.32	
Labor, steam	3,862.43	
Labor, water power	1,333.84	
Printing and stationery	373.52	
Expense	1,427.25	
		$22,727.27
		$19,118.72
Less.		
Incandescent lamps, operating	$576.94	
Loss and gain accounts	30.34	
Cost of flowage cases (lawsuits)	370.91	
Insurance on bolt shop	34.90	
Automobile	400.00	...
Line equipment	600.00	
Meters	200.00	
Tools	100.00	
Transformers	200.00	
Motors	100.00	
Electric equipment	2,400.00	
		$5,013.09
		$14,105.63
Charge off 8% depreciation on $90,011.03	$7,200.88	
Charge off 5% profit on $90,011.03	4,500.55	
		$11,701.43
Net gain from operation, 1912		$2,404.20
Interest	$556.54	
Grist mill	73.94	
		630.48
		$3,034.68
Operation of Grist Mill.		
Received from milling		$402.06
Operating Expenses.		
Labor	$255.62	
Insurance	72.50	
		328.12
		$73.94

ELECTRIC LIGHT PLANTS.

Data from Municipal and Private Plants in All Parts of the Country.—Equipment, Operation, Finances and Rates.

On the following pages will be found data from a considerable percentage of the municipal lighting plants of the country and a few of the private ones, all furnished directly to us by the superintendents or other officials of the plants. As less effort was made to obtain figures from the private than from the municipal plants, the ratio between the numbers of the two found in the tables is by no means indicative of that between all existing plants.

Conditions in different plants are so diverse that there would be little value in averages or totals of most of the columns, but the figures for each plant should be considered by themselves. It may be noted, however, that 25 per cent of the municipal plants reporting on this item have a greater or less length of their wires underground, in some cases this being confined to one block, probably in the business district. Sixty-two per cent furnish commercial light as well as street light. Fifty-five per cent of the departments are paid or credited by the city for the public lights furnished, some at a fixed rate, others a lump sum.

The full names of most of the companies supplying engines and dynamos and referred to in the table are given below. Some reported have gone out of business, others were not identified, and one or two may have been reported too late for this list, although inserted in the tables at the last minute.

ENGINES.—Allis-Chalmers Company, Ball Engine Company, Ball & Wood Co., Brownell & Co., Buckeye Engine Co., Chase Engine Co., De Laval Steam Turbine Co., Diesel Engine Co. (now Busch-Sulzer Bros.-Diesel Engine Co.), Engberg's Electric & Mechanical Works, Erie City Iron Works, Fitchburg Steam Engine Co., General Electric Co., Hamilton-Beach Mfg. Co., Hardie-Tynes Mfg. Co., Harrisburg Foundry & Machine Co., Hewes & Phillips Iron Works., Hoover-Owens-Rentschler Co., A. L. Ide & Sons., Lane & Bodley Co., McIntosh, Seymour & Co., Murray Iron Works, New York Engine Co., N. Y. Safety Steam Power Co., Phoenix Electric Co., Ridgway Dynamo & Engine Co., Russell Engine Co., Skinner Engine Company, Vilter Manufacturing Company, Westinghouse Machine Co.

DYNAMOS.—Allis-Chalmers Co. (includes Bullock), Burke Electric Co., Crocker-Wheeler Co., Eddy Electric Mfg. Co., Electric Machinery Co., Fairbanks-Morse Co., Fort Wayne Electric Works, General Electric Co., National Stamping & Electric Works, Ridgway Dynamo & Engine Co., Siemens & Halske, Sprague Electric Works, G. J. Stanley Electric Co., Warren Electric & Specialty Co., Western Electric Co., Westinghouse Electric & Mfg. Co.

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS.

Table No. 1. Equipment.

City	Miles of sts. lighted	Boilers: Number	Boilers: Total rated horse-power	Boilers: Make	Engines: Number	Engines: Total rated horse-power	Engines: Make	Dynamos: Number	Dynamos: Total k.w. capacity	Dynamos: Make	Street Lines: Total length of wire, ft.	Street Lines: Length of streets with overhead wires, ft.	Street Lines: Length of underground conduits, ft.
Alabama:													
Opelika	4	2	300	Casey-Hedges	1	225	Ball	1	187	Ft. Wayne	37,400	37,400	.....
Selma	..	3	950	Heine	3	1,550	H. O. R. & Turbine	3	950	General Electric	.....	.....	.....
Arkansas:													
Little Rock	500	1	350	Sterling	1	500	Curtiss turbine	1	500	General electric	97m	.....	0
Connecticut:													
So. Norwalk	17	4	500	Watertown	8	1,330	5 Watertown & 3 Diesel	8	885	Ft. Wayne, Eddy, Siemens & Halske	53m	17m	0
Delaware:													
Dover	10	3	350	Keller	3	510	Harrisburg, Ball and Watertown	3	440	Warren, Gen. Elec.	160,000	160,000	0
Milford	..	3	500	.....	2	360	Ames	4	200	Westinghouse	.....	.....	.....
Florida:													
Ocala	6	4	650	Cole, Schofield	2	270	Harrisburg	2	200	Westinghouse	.....	.....	.....
Georgia:													
Moultrie	..	3	400	**Schofield**	2	**300**	**Ball**	**2**	200	Westinghouse, Gen. Elec.	84,000	24,000	0
Illinois:													
Athens	5.5	2	160	Springfield	1	112	Ide	2	120	Westinghouse, Gen. Elec.	.....	.....	.....
Batavia	..	2	300	Burk	2	500	N. Y. Safety American	2	400	Westinghouse	16m	.....	.....
Bloomington	100a	2	720	Heine	3	1,000	Buckeye, Hamilton	3	700	Western Elec., Ft. Wayne	528,000	493,200	54,800
Blue Island	30	2	100	.....	2	150	.....	..	...	.....	.....	.....	0
Decatur	..	3	900	Erie	3	735	Ridgway	3	600	Ridgway	.....	.....	.....
Hinsdale	30	2	400	Altman	3	550	Ball & Wood, Erie	3	375	Westinghouse	215,200	161,400	4,000
Lincoln	..	4	625	Phoenix, Erie	2	900	Cooper, Harris	2	700	General Electric	375,650	.....	500
Marengo	5	2	250	Erie	2	225	Fitchburg	2	150	Ft. Wayne	5m	5m	0
Peru	20	4	600	Kewanee, Frost	2	400	Bates, Buckeye	3	250	General Electric	.....	.....	0
Rochelle	26	3	450	Kewanee	2	430	Bates, Watertown	2	250	Ft. Wayne	250,000	75,000	.....
Shelbyville	20	3	450	Atlas	4	480	Chuse, N. Y. Safety	4	340	Gen. Elec., Royal	105,600	95,040	10,560
Springfield	100	6	900	Springfield	5	800	Buckeye	9	510	Standard, Western	110m	75m	0
Waterloo	6.5	2	150	Brownell	2	235	Russell, Armington & Sims	2	150	Westinghouse	6.5m	6.5m	0
Iowa:													
Atlantic	25	4	460	Murray	3	650	Hamilton	3	490	Allis-Chalmers	66,400	66,000	5,000
Fairfield	25	..	...	.....	..	...	.....	..	...	.....	153,000	132,000	.....
Mt. Pleasant	..	3	240	Murray	2	400	Murray	2	350	Westinghouse	.....	.....	1,500
Vinton	20a	3	300	Murray	2	250	Murray	2	175	Westinghouse	.....	.....	12,000
Webster City	25	3	450	Murray	2	750	Murray	2	500	Westinghouse	318,000	79,500	5,350
Winterset	10	2	300	Murray	2	250	Bates, Sioux City	4	250	Ft. Wayne	.....	.....	.....
Kansas:													
Council Grove	7	3	260	.....	2	250	Murray	2	150	Minneapolis	9.5m	.....	0
El Dorado	5.5	3	300	Sterling	2	275	Westinghouse, Murray	2	200	Westinghouse, Allis-Chalmers	100,000	50,000	5,000
Garnett	..	2	135	Kewanee, Atlas	2	260	Bates, Hamilton	2	125	Ft. Wayne	20m	8m	0
Olathe	10	3	400	Erie	2	300	Monarch	2	225	General Electric	.....	.....	.....
Ottawa	25	3	330	Brownell	4	530	Russell, Bates, Weber & Otto	4	430	Westinghouse	300,000	.....	0
Sterling	11	1	150	Murray	1	150	Murray	3	155	Gen. Elec., Eddy, Warren	11m	.....	0
Topeka	80	3	450	Bromich	1	600	Murray	1	500	Westinghouse	528,000	400,000	15,000
Wellington	..	3	450	Bromich	3	500	Twin City	3	400	Allis-Chalmers, Elec. Machinery Co.			
Winfield	25	4	600	Kewanee	2	600	Murray	2	400	Bullock	.....	.....	2,000
Kentucky:													
Nicholasville	..	2	300	Brownell	2	335	Brownell, Greenwald	2	215	Ft. Wayne	.....	.....	.....
Paris	15	2	325	Sterling	2	480	General Electric	2	325	General Electric	18m	15m	.....
Louisiana:													
Thibodaux	..	..	...	.....	2	240	Diesel	2	170	Ft. Wayne	.....	.....	.....
Massachusetts:													
Ashburnham g	..	b	...	.....	..	...	.....	..	...	.....	76,300	68,000	.....
Belmont g	..	b	...	.....	..	...	.....	..	...	.....	529,160	136,987	.....
Braintree g	..	3	375	.....	3	625	.....	3	515	.....	696,258	150,000	.....
Chicopee	..	4	1,000	Dillon	3	1,500	Gen. Elec. turbine	3	1,500	General Electric	821,151	207,070	0
Concord g	..	3	270	.....	3	925	.....	3	608	.....	1,027,233	243,770	.....
Danvers g	..	3	375	.....	5	1,285	.....	7	1,116	.....	614,779	209,740	.....
Groton g	..	b	...	.....	..	...	.....	..	...	.....	208,560	69,000	.....
Groveland g	..	b	...	.....	..	...	.....	..	...	.....	235,580	78,810	.....
Hingham g	..	b	...	.....	..	...	.....	..	...	.....	920,428	185,298	.....
Holyoke	..	8	3,200	Babcock & Wilcox	3	6,000	Gen. Elec. turbine	3	6,000	General Electric	276m	.....	0

Hudson g	..	3	330		3	685		3	450		523,650	127,300	.....
Hull g	..	3	500		4	895		4	915		707,276	127,471	.....
Ipswich g	..	3	285		3	660		3	430		452,765	117,693	.....
Mansfield g	..	..	...		3	465		3	340		322,125	112,900	.....
Marblehead g	..	4	520		4	700		4	600		639,604	171,000	.....
Merrimac g	..	..	...		2	272		2	195		216,160	48,960	.....
Middleborough g	..	2	145		1c	150		2	350		310,634	118,300	.....
Millers Falls g	..	b	...		..	...		..	...		85,750	e	.....
No. Attleborough	33	3	750	Sterling, Morrin	4	800	Hamilton, Fitchburg, Shepherd	4	600	Westinghouse	.....	.....	.....
Norwood g	..	b	...		..	...		..	...		629,651	176,390	.....
Peabody	37	3	657	Robb	3	1,350	Rice, Greene	3	925	General Electric	990,000	210,000	.....
Reading g	..	3	375		3	630		3	500		814,756	209,477	.....
Rowley g	...	b	...		..	...		..	...		119,867	34,943	.....
Shrewsbury g	..	b	...		..	...		..	...		431,760	110,880	.....
Taunton g	..	4	1,200		3	3,550		5d	2,380		1,135,500	449,300	.....
Templeton g	..	b	...		..	...		..	...		286,003	78,272	.....
Wakefield g	..	2	250		2	250		2	180		581,657	181,551	.....
Wellesley	..	b	...		..	...		..	...		899,850	.....	.....
W. Boylston g	..	b	...		..	...		..	...		253,440	73,360	.....
Westfield g	..	3	400		3	1,485		4	1,230		321,220	112,079	.....
Michigan:													
Alpena	..	3	715	Ricard, Sterling	1	225	Allis-Chalmers	1	150	Bullock	.....	.....	.....
Bay City	193	8	800	Mackmorrow	4	1,100	Erie, Ball, Buckeye, Russell	5	730	Westinghouse, Gen. Elec., Ft. Wayne, Warren	1,056,000	.....	0
Holland	..	3	300	Sterling	2	...	Russell	2	425		.....	.....	.....
Lansing	75	13	4,100		3	...		3	3,400	Gen. Elec., Allis-Chalmers	.....	.....	.....
Marshall	18	f	...		..	...		2	437	Gen. Elec., Ft. Wayne	.....	.....	0
Monroe	..	3	375	Wickes	2	475	Murray, Russell	2	450	Western Elec., Am. Mach.	80,000	15m	250
Niles	20	..	125	Phoenix	..	120	Phoenix	2	600	Allis-Chalmers	479,255	20m	.....
St. Clair	10	2	275	Manning, McNeal	2	350	Ridgway	2	162	Westinghouse	52,800	.....	1,000
Minnesota:													
Fairmont	12	h	...	.....	3	640	Minneapolis, Steel & Machinery Co.	3	455	Allis-Chalmers Western Electric	.....	15	.....
Lake City	16	2	500	Sterling	3	600	Gen. Elec., Westinghouse, Reeves	3	350	Gen., Elec., Westinghouse	158,400	158,400	0
Montevideo	9.9	2	200	Bass	2	225	McIntosh, Armington & Sims	1	125	Elec. Mach. Co.	132,000	.....	0
Moorhead	7	2	400	Sterling	2	700	Twin City, West. turbine	2	500	Westinghouse	71,200	.....	4,200
Rochester	12	3	6?5	Heine	2	900	Ball, Allis-Chalmers	2	620	.....	.....	.....	.....
Shakopee	6	2	300	Brownell	1	125	Ideal	1	75	Westinghouse	95,000	19,000	.....
Thief Riv. Falls	5	..	...	.....	2	500	Diesel	4	500	Sprague, Triumph	.....	.....	.....
Mississippi:													
Canton	12	3	564	Sterling	3	475	L. & B. Ideal, Buckeye	3	287	Ft. Wayne	.....	12m	0
Greenwood	35	2	450	Walsh	3	950	Wheelock	3	615	Gen. Elec., Bullock	184,800	.....	.....
Kosciusko	10	3	300	Zier	3	370	Hardie-Tynes, Chandler, Liddell	3	200	Ft. Wayne, Gen. Elec.	.....	.....	0
Yazoo City	10	4	682	Babcock & Wilcox	2	225	Harrisburg	2	300	Stanley	52,800	52,800	.....
Missouri:													
Bethany	..	2	250	Brownell	2	225	Erie, Ball, Sioux City	2	180	Allis-Chalmers, Gen. Elec.	.....	.....	.....
Butler	10	2	300	Erie, Geary	3	350	Ideal, Erie, Engberg	3	230	Westinghouse, Engberg	.....	50,000	0
Cameron	35	2	400	Murray	2	265	Bates, Buffalo Forge	2	225	Gen. Elec., Westinghouse	76,000	.....	.....
Fulton	16	3	375	Erie	2	270	Erie, Ball	2	195	Allis-Chalmers	.....	.....	0
Lamar	12	2	300	Freeman	2	300	Wisconsin, Allis-Chalmers	2	225	Allis-Chalmers	105,600	11.5m	2,500
Mexico	25	4	750	Heine	2	800	Hamilton	2	450	Bullock	100m	25m	.....
Monroe City	..	2	150	.....	1	90	Chuse	1	60	Western Electric	.....	.....	1,500
Slater	10a	3	425	O'Brien	2	250	Ridgway	2	160	Ridgway	.....	.....	0
Unionville	..	2	200	Murray	1	130	Murray	1	100	Fairbanks-Morse	.....	.....	.....
Nebraska:													
Alliance	4.5	2	350	Erie	2	...	Erie	2	400	Ft. Wayne	.....	.....	.....
Crete	..	2	250	Atlas	2	250	Allis-Chalmers, Murray	3	217	General Electric	55,300	52,800	2,500
Hastings	40	4	900	Springfield	2	1,100	Allis-Chalmers, Westinghouse	2	800	Bullock, Westinghouse	260,000	.....	6,000
Schuyler	10	3	220	Babcock & Wil., Erie	1	150	Ball	2	84	General Electric	.....	.....	3,000
Tecumseh	6	2	275	Erie, Frost	2	250	Buckeye	2	170	Westinghouse	105,000	105,000	5,760
Orange	38	2	450	Heine	2	650	Hewes & Phillips	2	400	Ft. Wayne	70m	38m	0
Washington	10.5	2	250	Phoenix	3	385	Phoenix, Skinner	3	365	Gen. Elec., Westinghouse	194,620	52,860	0
New York:													
Bath	..	2	200	Payne	1	250	Ball & Wood	2	195	Westinghouse	.....	.....	.....
Canajoharie	6	b	...	.....	..	...	.....	..	...	.....	47,800	28,900	1,500
Canastota	7	2	100	Mack	2	225	Ball, Nash	1	75	Westinghouse	50,000	35,000	0
Fairport	12	3	450	Keller	2	450	Hamilton, Allis	2	300	General Electric	278,390	12m	0

For footnotes, see page 174.

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS.—Continued.

City	Miles of sts. lighted	Boilers: Number	Boilers: Total rated horse-power	Boilers: Make	Engines: Number	Engines: Total rated horse-power	Engines: Make	Dynamos: Number	Dynamos: Total k.w. capacity	Dynamos: Make	Street Lines: Total length of wire, ft.	Street Lines: Length of streets with overhead wires, ft.	Street Lines: Length of underground conduits, ft.
New York (Continued):													
Mohawk	5.5	b	...	.....	..	...	.....	..	...	.....	61,300	6,000	.....
Solvay	14	b	...	.....	..	...	.....	..	...	.....	105,600	14m	.....
North Carolina:													
Elizabeth City	11	3	750	Erie	3	600	Ball, Ball & Wood	3	420	Stanley	178,200	58,080	.....
Gastonia	...	b	...	.....	..	....	.....	..	....	.....	.....	.....	.....
North Dakota:													
Wahpeton	10	2	450	Heine H. R. T.	1	500	McIntosh, Seymour	1	350	General Electric	136,000	55,000	.....
Ohio:													
Celina	6	4	100	Erie	2	400	Skinner, Russell	2	...	Ft. Wayne Westinghouse	8m	.....	0
Cuyahoga Falls	14	2	250	Erie	2	510	Buckeye, Shepherd	2	275	Crocker-Wheeler, Westinghouse	.....	.....	.....
Greenfield	12	2	600	Sterling	3	500	Skinner	3	375	Ft. Wayne	.....	.....	0
Hamilton	100	4	1,000	Babcock & Wilcox	3	1,750	Hamilton	3	1,000	Bullock	.....	100m	2,000
Lisbon	7	b	...	.....	..	...	.....	..	...	.....	50,000	36,000	.....
Miamisburg	..	4	450	Brownelle	2	550	Buckeye	2	400	Westinghouse	.....	.....	.....
Niles	30	b	...	.....	..	....	.....	..	....	.....	25m	25m	5,000
Wapakoneta	..	3	480	Erie	2	600	Lane & Bodley	4	360	Ft. Wayne	49m	.....	0
Oklahoma:													
Durant	..	2	350	Ames	2	300	Ball	2	200	Hawthorne, Gen. Elec.	.....	.....	.....
Edmond	5	1	125	Brownell	4	280	Bessemer	2	110	Allis-Chalmers	31,000	.....	0
Enid	40	4	1,220	Babcock & Wilcox	5	1,550	Murray	7	1,500	Gen. Elec., Western	176m	40m	2,900
Vinita	..	3	750	O'Brien, Murray	2	650	Allis-Chalmers, Twin City	2	500	Allis-Chalmers	.....	.....	.....
Wynnewood	2	2	200	.....	2	200	Skinner, Monarch	2	145	Ft. Wayne, Bullock	.....	.....	0
Pennsylvania:													
Coatesville	5	6	1,600	Heine, Keeler	3	2,100	Westinghouse turbine, Corliss	3	1,750	Westinghouse	.....	.....	0
Doylestown	5	4	500	Lebanon, Keeler	2	230	Ames	2	200	Westinghouse	10m	.....	0
Easton	20	3	360	Noyes	2	250	Noyes	4	...	Western Electric	42m	20m	0
Ephrata	6	2	300	Gem, Coatesville	2	230	Hardie-Tynes, Armington & Sims	2	180	Westinghouse, Gen. Elec.	53,800	31,680	.....
Mauch Chunk	8	1	300	Sterling	1	500	Allis-Chalmers	2	500	Westinghouse	12m	8m	0
Media	18a	1	100	Wetherill	1	125	Harrisburg	1	75	Westinghouse	105,600	105,600	0
Mt. Carmel	..	5	1,500	Keeler, Babcock & Wil.	3	1,300	Hamilton, Erie, McEwen	6	1,060	Westinghouse, Gen. Elec.	.....	20m	0
Norristown	..	2	250	Newbold	1	250	.....	3	145	General Electric	.....	.....	0
South Carolina:													
Abbeville	7.5	1	200	Cole	1	200	Hardie-Tynes	1	200	General Electric	116,160	36,960	480
Florence	..	4	500	Lombard, Walsh	3	525	Ball & Wood	2	450	Allis-Chalmers, Ft. Wayne	25m	25m	0
Greenwood	15	2	200	Cole	1	175	Hardie-Lynes	1	250	National	50m	15m	0
Rock Hill	14	2	250	Erie	1	400	Erie	1	250	Westinghouse	150 000	80,000	1,200
South Dakota:													
Sioux Falls	50	2	375	Kenney	2	...	Westinghouse, Ideal	1	65	Ft. Wayne	80m	80m	500
Tennessee:													
Dyersburg	8	5	600	Casey & Hedges	2	550	Chuse	2	435	General Electric	25m	8m	200
Jackson	..	3	400	Sterling	1	250	Hooven-Owens	2	120	General Electric	32m	.....	.....
Texas:													
Austin	...	6	2,273	Aultman-Taylor, Babcock & Wil., Heine	2	1,250	Risdon, Allis-Chalmers	6	2 200	Gen. Elec., Allis-Chalmers	.....	.....	22,000
Fort Worth	...	b	...	.....	..	...	.....	..	...	.....	.....	.....	.....
Galveston	90	b	...	.....	..	...	.....	..	...	.....	56m	20m	4m
Utah:													
Ephraim	16	..	...	.....	..	...	.....	1	150	General Electric	.....	5,280	.....
Springville	10	..	...	.....	..	...	.....	1	100	Westinghouse	.....	.....	.....
Virginia:													
Richmond	192	2	800	Babcock & Wilcox	2	2,000	Gen. Elec. turbine	6	2,800	General Electric	.....	.....	.....
Washington:													
Seattle	643	f	...	.....	..	...	.....	5	12,000	Westinghouse, Bullock	16,932,432	3,000,000a	204,864
West Virginia:													
Davis	3	1	150	Erie	1	150	Russell	1	90	Warren	30,000	15,000	0
Wisconsin:													
Fort Atkinson	..	3	390	Sterling	2	330	Vilter	2	200	General Electric	.....	.....	.....
Oconomowoc	12	3	300	Milwaukee, Freeman	4	600	Allis-Chalmers, Gen. El.	4	400	Ft. Wayne, Gen. Elec.	198,600	165,760	.....
Canada:													
Kingston, Ont.	..	7	700	Can. Loco., Selby	2	700	.....	8	1,567	Gen. Elec., West. Elec.	37m	.....	.....
Victoria, B. C.	100	4	400	Hamilton	1	350	Hamilton	..	...	.....	.....	500,000	50,000
Winnipeg, Man.	..	f	...	.....	..	...	.....	5	1 800	Vickers	20,000,000	2,500,000	500,000

a—Approximate. b—Current bought. c—Also two water wheels and three gas engines. d—Also two power generators. e—No record. f—Water power. g—Figures for 1911, from Report of Massachusetts Gas and Electric Light Commission. h—Producer gas plant. m—Miles.

DATA CONCERNING PRIVATE ELECTRIC LIGHT PLANTS.

Table 1A. Equipment.

City	Miles of sts. lighted	Boilers: Number	Boilers: Total rated horse-power	Boilers: Make	Engines: Number	Engines: Total rated horse-power	Engines: Make	Dynamos: Number	Dynamos: Total k.w. capacity	Dynamos: Make	Street Lines: Total length of wire, ft.	Street Lines: Length of streets with overhead wires, ft.	Street Lines: Length of underground conduits, ft.
Connecticut:													
Bristol	..	6	1,400	Hazleton	2	2,000	Gen. Elec. turbine	2	1,500	General Electric	40m	.....	.....
Illinois:													
Sparta	6	2	230	Rohan	2	300	Ideal, Porter Allen	2	300	General Electric	.....	60,000	.....
Urbana	8	2	375	Heine	1	750	Allis-Chalmers	..	...	.....	.....	.....	.....
Iowa:													
Dubuque	40	6	2,400	Babcock & Wilcox	2	...	Gen. Elec. turbine	2	4,500	General Electric	.....	75m	0
Sheldon	5.5	2	250	.....	2	300	.....	2	265	Bullock	.....	.....	.....
Storm Lake	..	2	175	.....	2	175	.....	3	150	Eddy	17,000	3m	0
Kansas:													
Parsons	20	5	500	Kewanee, Erie	3	1,500	Cooper, Twin City, Allis-Chalmers	3	1,100	Allis-Chalmers, Gen. Elec.	.....	.....	.....
Maine:													
Rockland	..	4	125	Hodge	3	1,500	Wetherill	5	1,500	General Electric	.....	.....	.....
Maryland:													
Frostburg	15	3	500	Erie	2	700	Erie, Ames	4	550	Ft. Wayne	20m	20m	0
Michigan:													
Marine City	18	2	250	Erie	2	200	Dick & Church	2	250	General Electric	.....	.....	0
Minnesota:													
St. Paul	93	13	7,800	Springfield	4	9,000	Westinghouse, Gen. Elec. Allis-Chalmers	5	5,300	Westinghouse, Gen. Elec., Bullock	5,918,800	1,143,919	101,886
Missouri:													
California	7	2	300	O'Brien, Frost	1	200	St. Louis	1	125	Westinghouse	15m	9m	0
Nebraska:													
McCook	4	2	525	Heine, Lyons	2	250	Ideal, Gen. El. turbine	2	175	General Electric	.....	50 000	.....
New Jersey:													
Cape May	30	4	1,000	Keeler, Sterling	5	1,400	Westinghouse turbine, Russell	5	1,000	Westinghouse	.....	.....	.....
New Mexico:													
Roswell	10	3a	600	Babcock & Wilcox	5	1,700	Westinghouse, Allis-Chalmers, Ideal	5	1,350	Westinghouse, Gen. Elec.,	929,933	.....	.....
New York:													
Deposit & Hancock.	15	2	225	Erie	2	385	Ball, McEwen	2	100	General Electric	.....	.....	0
Owego	20	2	400	Wilkinson	3	825	Skinner, De Laval turb.	4	750	General Electric	252,496	20m	.....
Schenectady	100	b	...	.....	..	...	.....	7	4,000	General Electric	4,050,991	779,400	296,040
Ohio:													
Kenton	..	4	500	Atlas	4	485	Russell, Buckeye	4	450	Gen. Elec., Westinghouse	.....	.....	.....
Pennsylvania:													
Corry	30	2	400	Phoenix	3	500	Clark, Noyes, Skinner	3	350	Bullock, Gen. Elec., Burke	70m	.....	0
New Castle	..	6	1,750	.....	3	...	.....	3	2,500	Westinghouse turbine	.....	.....	.....
Lower City	..	2	500	Keeler	2	475	Nagle	2	260	Westinghouse	.....	147,840	.....
Texas:													
Corpus Christi	10	2	400	Sterling	4	700	Diesel, Hamilton, Atlas	4	525	Gen. Elec., Ft. Wayne	.....	.....	.....
Gonzales	12	c	...	.....	..	...	.....	4	650	Westinghouse, Allis-Chalmers, Gen. Elec.	12m	.....	.....
Navasota	15	3	550	.....	3	500	Diesel	3	370	Westinghouse, Gen. Elec.	.....	.....	.....
Wisconsin:													
Eau Claire	..	4	400	.....	1	400	.....	7	8,250	General Electric	539 600	.....	0
Marinette	..	c	...	.....	..	...	.....	..	...	.....	618,500	.....	0
Merrill	15	4	400	Stiles	1	250	Stiles	3	450	.....	88,000	90,000	0
Monroe	10	2	500	Freeman, Lyons	2	350	Ball, Allis-Chalmers	2	250	General Electric	12m	.....	.....

a—Also 6 Westinghouse 1500 h.p. gas producers. b—Current bought. c—Water power. m—Miles.

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS.

Table No. 2. Operation.

City	Fuel: Coal used, tons,	Fuel: Price	Fuel: Screenings, tons,	Fuel: Price	Other sources of power	Current: Total generated k.w.h.	Current: Used for street lights, k.w.h.	Current: Sold to commercial customers, k.w.h	Receipts: Paid or credited by city	Receipts: From commercial customers	Connected Load: No. of Public arc lamps	Connected Load: No. of commercial arc lamps	Connected Load: No. of public incandescent lamps	Connected Load: No. of commercial incandescent lamps	Connected Load: Total lighting load kw.	Total lighting and power load kw.
Alabama:																
Opelika	170	$2.55	....	....	.....	280,000	4,500	275,500	$405	$16,000	30	...	125	4,200	135	156
Selma	5,000	2.50	....	....	.....	1,500,000	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Arkansas:																
Little Rock	....	....	....	....	Gas at 12½ & 10c.	.....	.....	0	0	0	528	0	0	0	247	.....
Connecticut:																
Greenwich	....	....	....	....	Current bought	1,960,358	258,759	1,068,321	19,123	133,687	40	0	658	75,000	3,806	4,190
South Norwalk	1,135	3.50	nominal	$1.25	Diesel Oil Eng.	1,469,780a	224,490	1,245,290	7,471	58,907	118	50–80	48	19,111	1,197	2,067
Delaware:																
Dover	1,000	4.25	....	....	.....	197,299	75,000	122,299	4,500	7,438	0	0	370	6,430	.....	.....
Milford	....	4.20	....	....	.....	.....	.....	.....	.....	.....	0	0	125	2,500	.....	.....
Florida:																
Ocala	q	.....	.....	.....	.....	480,000	44,000	414,000	6,300	11,700	50	0	100	6,000	190	220
Georgia:																
Moultrie	1,350	3.30	....	....	.....	160,000	45,000	108,218	0	10,822	22	...	70	3,000	.....	.....
Illinois																
Athens	....	1.25	....	.05b	.....	.....	.....	.....	.....	.....	...	...	6	.....	40	40
Batavia	3,000	2.14	....	....	.....	.....	.....	.....	.....	.....	...	...	400	5,000	.....	.....
Bloomington	3,000	1.55	....	1.55	.....	960,000	640,000	0	0	0	0	0	600	0	200	200
Blue Island	500	1.97	....	....	Buy from San Dist.	.....	.....	.....	.....	.....	165	10	10	.....	350	500
Decatur	2,597	1.98	....	1.98	.....	649,700	649,700	0	0	0	630	0	1,000	0	.....	.....
Hinsdale	....	....	2,880	1.95	.....	.....	.....	.....	.....	.....	0	0	300	10,000	125	175
Lincoln	3,734	....	....	1.55	.....	1,009,050	292,365	718,685	9,300	26,547	153	5	7	12,019	.....	.....
Marengo	....	2.50	....	....	.....	.....	.....	.....	.....	.....	...	...	104	.....	.....	.....
Peru	2,920	2.15	....	....	.....	504,066	.....	.....	4,000	.....	0	7	800	.....	.....	.....
Rochelle	4,000	2.65	....	....	.....	.....	.....	.....	7,600	14,061	54	0	.....	7,000	120	200
Shelbyville	....	....	2,880	3.744	.....	.....	.....	.....	.....	.....	...	14	800	4,000	120	170
Springfield	7,000	1.05	....	....	.....	.....	.....	0	.....	.....	705	0	0	0	.....	.....
Waterloo	1,000	1.55	....	....	0	.....	.....	.....	.....	500	0	0	0	1,640	.....	.....
Iowa:																
Atlantic	....	....	4,000	2.07	.....	912,500	365,000	5,500	3,500	22,000	0	0	220	c	250d	250
Fairfield	....	....	....	....	Cur'nt bought at 3c.	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Mt. Pleasant j	2,374	2.65	....	....	.....	309,150	21,800	175,272	0	16,175	29	1	.....	.....	.....	150d
Vinton	3,300	2.85	....	....	0	400,000	.....	.....	3,000	15,000	...	...	460	6,000	.....	.....
Webster City	....	....	4,139	1.87	.....	.....	.....	.....	4,000	.....	0	0	c	10,000	700e	1,250e
Winterset	....	2.15	....	....	.....	.....	.....	.....	.....	.....	...	...	360	5,000	.....	.....
Kansas:																
Council Grove	....	....	120	2.30	.....	.....	.....	.....	3,120	7,200	14	0	....	.....	.....	.....
El Dorado	1,000	3.00	....	....	Gas engine	.....	.....	.....	3,000	9,000	22	5	200	4,000	140	146
Garnett	....	2.20	....	....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Olathe	1,460	2.00	....	....	.....	.....	.....	.....	3,195	12,000	27	7	65	.....	.....	.....
Ottawa	....	....	3,000	2.23	Gas engine	681,610f	94,109	392,691	4,154	15,422	27	...	185	.....	.....	200d
Sterling	....	....	....	3.00	Oil engines	.....	.....	.....	1,848	8,400	0	0	24	c	100	125
Topeka	2,000	2.50	.....	.....	.....	.....	.....	0	21,000	0	500	0	895	0	280	.....
Wellington	200	2.35	.....	.....	.....	.....	.....	.....	2,500	17,690	100	0	200	5,000	200	350
Winfield	4,380	2.25	....	....	.....	.....	.....	.....	.....	.....	113	...	.....	.....	300	.....
Kentucky:																
Nicholasville	1,200	2.30	....	....	.....	.....	.....	.....	.....	.....	60	0	0	6,000	.....	.....
Paris	1,800	2.40	.....	.....	.....	350,000	100,000	.....	.....	.....	39	...	210	.....	.....	200
Louisiana:																
Thibodaux	....	....	....	....	Crude oil at 1.95 cts. per gal.	216,000	38,400	82,000	0	8,000	0	1	290	4,100	.....	.....
Massachusetts:																
Ashburnham n	....	....	....	....	Current bought	61,200	6,380	34,613	1,460	4,366	...	...	100	1,608	73	73
Belmont n	....	....	....	....	Current bought	263,304	73,020	116,671	5,105	13,493	11	...	329	13,120	604	620
Braintree n	462	....	883	....	.....	457,430	167,550	226,042	13,081	23,789	...	...	595	c	c	c
Chicopee	4,500	4.15	....	....	0	1,277,762	371,297	906,465	g	44,613	243	0	108	.....	.....	600e
Concord n	1,578	....	....	....	.....	585,470	152,886	306,338	14,921	26,755	...	...	1,130	16,000	845	898
Danvers n	1,679	....	226	....	.....	872,433	170,515	436,068	9,243	31,135	118	4	540	16,474	889	1,029
Groton n	....	....	....	....	Current bought	27,870	14,983	8,929	5,227	1,103	...	...	383	1,925	101	101
Groveland n	....	....	....	....	Current bought	67,890	38,463	27,455	3,065	1,987	...	...	245	2,000	118	124
Hingham n	....	....	....	....	Current bought	372,105	87,706	161,237	7,761	17,127	6	...	741	14,159	742	796
Holyoke k	16,743	4.20	....	....	Water power, 1,000 h.p.	12,991,000	962,100	2,250,000	27,846	266,626	471	352	268	110,531	5,236	10,323

Hudson n	1,110	....	....	....	.....	513,603	68,793	316,725	6,277	20,814	15	...	384	9,536	507	221
Hull n	1,149	....	279	....	.....	380,699	41,308	217,856	11,400	29,398	...	3	724	22,596	1,167	1,213
Ipswich n	1,100	....	....	....	.....	c	c	c	5,784	8,594	c	...	.....	.....	.....	.....
Mansfield n	....	....	....	....	Fuel oil	468,900	97,569	202,246	8,666	16,765	...	...	573	c	c	c
Marblehead n	1,885	....	....	....	.....	875,040	423,056	289,464	$10,709	$29,727	172	2	299	c	c	c
Merrimac n	566	....	234	....	.....	216,310	37,590	153,737	.....	8,549	...	...	383	1,554	97	211
Middleborough n	510	....	....	....	.....	315,189	36,055	168,086	8,200	20,554	25	15	202	8,012	509	626
Millers Falls n	....	....	....	....	Current bought	54,010	7,328	25,547	1,418	3,112	3	...	88	c	c	c
North Attleboro	....	4.50	....	....	Current bought	533,517	80,690	361,420	0	30,246	0	0	780	.....	300	650
Norwood n	....	....	....	....	Current bought	664,950	63,768	482,475	3,900	21,736	...	1	595	10,520	501	1,035
Peabody	4,225	4.13	....	....	.....	2,074,970	309,900	1,765,070	6,080	61,662	138	5	515	19,265	963	2,066
Reading n	1,210	....	350	....	.....	727,405	238,235	329,255	10,225	25,927	125	4	287	18,604	817	914
Rowley n	....	....	....	....	Current bought	18,450	8,586	6,456	.....	1,500	...	...	146	586	9	9
Shrewsbury n	....	....	....	....	Current bought	84,639	23,650	29,124	4,700	3,663	...	...	337	3,750	176	333
Taunton n	4,195	....	....	....	.....	2,821,700	662,188	1,489,466	.....	77,000	197	117	1,650	19,500	1,171	2,375
Templeton n	....	....	....	....	Current bought	73,300	19,783	36,189	.....	5,000	...	1	234	2,650	136	146
Wakefield n	606	....	....	....	611 tons coke	270,432	88,113	121,099	10,630	63,740	48	...	536	c	c	c
Wellesley	....	....	....	....	Current bought	.....	118,614	313,736	.....	31,036	...	...	920	690	1,123,900	1,123,940
West Boylston n	....	....	....	....	Current bought	31,680	14,291	5,949	.....	900	...	...	179	1,040	49	49
Westfield n	3,094	....	....	....	96 tons breeze	943,400	306,300	438,926	13,500	77,900	131	16	82	c	c	c
Michigan:																
Alpena	....	....	....	....	.....	.....	.....	.....	.....	.....	136	0	0	.....	.....	.....
Bay City	7,200	2.50	0	....	0	1,389,783	603,906	415,650	27,500	13,427	500	c	.....	10,560	793	184
Holland	....	....	....	....	.....	2,088,444	224,840	1,515,866	13,764	51,393	...	...	.....	.....	.....	.....
Lansing	18,000	2.77	....	....	.....	.....	.....	.....	21,000	87,742	185	...	.....	.....	1,974	1,188
Marshall	0	....	....	....	Water power	729,270	183,533	315,651	3,770	12,804	106	30	21	10,000	.....	.....
Monroe	....	2.65	....	....	.....	730,000	219,000	.....	7,000	.....	150	0	30	4,000	.....	.....
Niles	150	3.75	....	....	Water power	200	75	.....	7,000	16,500	86	25	50	.....	.....	.....
St. Clair	900	3.15	....	....	.....	.....	.....	70,000	1,300	7,087	49	...	12	7,000	.....	.....
Minnesota:																
Fairmont	600	.....	.....	.....	.....	.....	.....	.....	2,600	19,000	13	4	180	9,000	.....	.....
Montevideo	400	5.65	....	....	Water power	.....	38,750	320,000	2,486	25,514	10	4	121	4,000	.....	.....
Moorhead	2,500	5.80	....	....	.....	820,180	.....	559,755	.....	37,353	11	25	175	11,500	.....	.....
Rochester	5,000	3.95	.....	.....	.....	1,200,000	116,196	.....	12,274	55,591	135	0	800	17,500	.....	.....
Shakopee	....	3.60	....	....	.....	.....	.....	.....	800	8,400	...	...	100	3,000	75d	50d
Thief River Falls	....	....	....	....	Water power & oil at 6.7 cts. per gal.	.....	.....	.....	.....	.....	20	0	350	10,000	300	375
Mississippi:																
Canton	2,880	2.07	.....	.....	.....	.....	.....	.....	4,800	13,647	0	3	140	0	100	100
Greenwood	7,000	2.25	.....	.....	.....	30,000	10,000	20,000	7,200	3,000	72	...	.....	15,000	.....	.....
Kosciusko	548	2.50	0	....	.....	65h	22h	40	2,460	6,000e	22	3	53	800	70	70
Yazoo City	4,000	2.68	....	....	.....	c	c	c	7,140	22,380	72	...	10	90,000e	100e	200e
Missouri:																
Bethany	2,199	1.71	.....	.....	.....	.....	.....	.....	.....	.....	...	...	174	5,000	.....	.....
Butler	2,000	1.875	....	....	.....	.....	.....	.....	.....	8,000	4	0	125	5,000	100	100
Cameron	....	.....	3,000	1.14	.....	.....	.....	.....	.....	11,799	...	...	225	9,150	475	805
Fulton	4,380	2.60	....	....	.....	c	c	c	0	15,000	20	0	250	20,000	175	175
Lamar	....	.....	.....	1.50	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Mexico	....	....	7,560	2.25	.....	.....	.....	.....	4,000	40,000	80	...	.....	20,000	.....	.....
Monroe City	900	2.50	....	....	.....	.....	.....	.....	1,000	7,010	2	2	95	2,000	.....	.....
Slater	1,800e	2.70	....	....	.....	c	.....	.....	.....	.....	0	0	75	5,000e	.....	.....
Unionville	1,200	2.75	....	....	.....	.....	.....	.....	.....	.....	...	...	150	1,500	.....	.....
Nebraska:																
Alliance	2,500	2.15	....	....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Crete	1,215	3.90	....	....	.....	131,289	22,103	119,186	1,326	10,727	30	0	26	8,000	100	125
Hastings	....	3.55	....	....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Schuyler	1,600	4.23	....	....	.....	c	c	c	0	7,900	1	4	160	6,000	75	.....
Tecumseh	1,200	3.80	....	....	.....	c	c	c	.....	.....	5	0	205	3,000e	c	c
New Jersey:																
Orange	1,000	3.65	....	....	.....	720,000	720,000	0	24,000	0	372	...	185	.....	195	.....
Washington	1,180	2.37	....	....	.....	172,507	52,700	103,657	3,879	11,029	40	2	68	3,655	214	307
New York:																
Bath	850	2.60	....	....	Water power	340,107	119,600	126,776	5,000	11,000	72	...	4	6,000	90	120
Canajoharie	....	....	....	....	.....	.....	.....	.....	.....	.....	0	0	250	3,450	200	360
Canastota	1,000	4.00	....	....	Gas for reserve	144,000	144,000	0	6,000	0	58	0	63	0	.....	.....
Fairport	1,712	2.89	....	....	.....	389,723	131,344	258,379	4,633	16,398	73	...	26	.....	40	185d
Mohawk	....	....	....	....	Current bought	.....	68,440	99,277	2,853	6,315	25	...	27	3,000	125	175
Solvay	....	....	....	....	Current bought	.....	74,020	178,189	2,000	13,323	...	...	215	6,000	200	350
North Carolina:																
Elizabeth City	m	....	....	....	.....	.....	.....	.....	.....	.....	41	...	264	10,000	.....	.....
Gastonia	....	.....	.....	.....	Power bought	.....	.....	.....	.....	17,277	29	1	185	.....	.....	.....
North Dakota:																
Wahpeton	....	....	1,000	4.75	Water power	263,240	59,577	450,175	3,169	23,187	32	...	8	.....	.....	200

For footnotes, see page 178.

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS.—Operation.—Continued.

City	Fuel: Coal used, tons,	Fuel: Coal used, Price	Fuel: Screenings, tons,	Fuel: Screenings, Price	Other sources of power	Current: Total generated k.w.h.	Current: Used for street lights, k.w.h.	Current: Sold to commercial customers, k.w.h	Receipts: Paid or credited by city	Receipts: From commercial customers	Connected Load: No. of Public arc lamps	Connected Load: No. of commercial arc lamps	Connected Load: No. of public incandescent lamps	Connected Load: No. of commercial incandescent lamps	Connected Load: Total lighting load kw.	Connected Load: Total lighting and power load kw.
Ohio:																
Celina	1,820	0.90	....	....	Water power	.....	.....	.....	6,750	650	90	0	0	.....	.....	.....
Greenfield	2,500	2.30	....	....	.....	.....	.....	.....	.....	.....	100	0	0	12,000	.....	.....
Hamilton	9,000	1.95	....	....	.....	3,150,000	945,000	.....	0	64,620	365	80	.....	.....	800	1,000
Lisbon	....	....	....	....	.....	.....	.....	.....	.....	.....	...	...	168	.....	70	90
Miamisburg	2,500	2.15	.....	.....	.....	.....	.....	.....	.....	.....	99	16	9,600	.....	.....	.....
Niles	....	.....	.....	.....	Power bought 2c. per k.w.h.	.....	206,687	577,580	0	23,197	110	30	615	5,000	.....	.....
Wapakoneta	3,750	2.25	....	....	Current bought	.....	.....	.....	.....	.....	89	...	9	12,000	.....	.....
Oklahoma:																
Durant	1,080	3.00	....	....	.....	.....	216	.....	280	7 200	50	...	25	1,200	.....	.....
Edmund	....	....	....	....	Gas at 25 & 16c.	.....	.....	.....	.....	.....	17	...	37	2,700	60	85
Enid	....	3.17	....	....	Fuel oil	1,839,974	.....	.....	.....	.....	139	25	172	23,875	1,709	7,332
Vinita	....	2.25	.....	.....	Oil, $1 per bbl.	.....	.....	.....	4,000	20,000	8	0	64	6,000	250	.....
Wynne Wood	1,095	3.65	....	....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Pennsylvania:																
Coatesville	400e	2.70	....	....	.....	2,250,000e	182,500	1,165,000	.....	70,000	100	30	50	20,000e	540d	740
Doylestown	1,200	3.00	....	....	.....	.....	.....	.....	.....	.....	56	20	61	4.000	.....	.....
Easton	1,750	2.90	....	....	.....	390,000	390,000	0	0	0	316	0	0	0	390,000	.....
Ephrata	1,095	2.75	....	....	.....	.....	.....	.....	.....	.....	38	...	36	.....	.....	.....
Mauch Chunk	750	3.25	....	....	Water power	1,300,000	.....	.....	4,452	30,000	32	46	85	12,500	.....	325
Media	500	2.20	....	....	.....	170,000	160,000	0	.....	.....	100	0	400	0	42	.....
Mt. Carmel	....	1.10	....	....	.....	500	65	435	9,793	50,000	151	25	36	12,000	500	600
Norristown	....	....	....	....	Water power	.....	all	0	.....	0	231	0	620	0	130	130
South Carolina:																
Abbeville	5	4.25	....	....	Water power	36,500	.....	.....	4,960	9,593	68	0	30	.....	36,500	54,750
Florence	2,000	3.50	....	....	.....	571,450	145,000	426,450	.....	.....	78	12	38	12,000	600	800
Greenwood	....	3.25	....	....	Water power	250h	50h	200h	6,380	20,000	88	...	50	12,000	250	250
Rock Hill	....	....	....	....	Current bought	720,000	172,800	500,000	5,500	30,000	88	...	50	15,500	300	500
South Dakota:																
Sioux Falls	....	....	....	....	.....	.....	.....	.....	.....	.....	226	0	650	0	.....	.....
Tennessee:																
Dyersburg	....	....	4,000	.40	.....	250,000	5,000	245,000	7,000	20 000	15,000	...	60	.....	180	225
Jackson	1,240	2.10	....	....	.....	240,000	240,000	0	7,200	0	...	...	.....	.....	60	.....
Texas:																
Austin	20,075 o	1.36	.....	.....	Water power	4,000,000	166p	3 749,120	12,500	84,172	180	35	48	.....	1,400	1,600
Fort Worth	....	....	....	....	Current bought	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Galveston	....	....	....	....	Current bought	.....	.....	.....	.....	.....	380	...	310	.....	140	.....
Utah:																
Ephraim	....	....	....	....	.....	.....	.....	90	.....	.....	16	...	200	.....	30	120
Springville	....	....	....	....	.....	300,000	173,110	126,890	.....	.....	...	...	170	.....	.....	.....
Virginia:																
Richmond	1,640	3.30	....	....	Water power	4,630,411	2,853,521	0	i	i	1,270	0	2,555	.....	755	1,155
Washington:																
Seattle	....	.....	.....	.....	Water power	30,310,200	4,690,060	16,927,306	220,633	566,300	929	94	5,876	283,510	15,309	20,387
West Virginia:																
Davis	840	1.70	....	....	.....	146,000	54 750	91,250	175	250	24	0	30	0	400	.....
Wisconsin:																
Fort Atkinson	....	....	2 500	3.50	.....	522,450	48,105	278,964	4,000	17,858	...	...	23	700	247	970
Oconomowoc	1,423	4.05	....	....	Water power	422,390	.....	.....	.....	.....	51	...	52	8,624	500	700
Canada:																
Winnipeg	....	....	....	....	.....	40,392,500	3,654,397	27,937,713	31,6431	419,313	2,214	200	500	.....	.....	.....
Kingston, Ont.	....	....	3,794	3.24	.....	1,482 399	335,030	1,147,369	.....	.....	...	...	.....	.....	.....	.....
Victoria, B. C.	....	....	....	....	Current bought	.....	600	.....	.....	.....	750	...	5,000	.....	600	.....

a—1,367,025 k.w.h. by oil, balance by coal. b—Per bushel. c—Not Known. d.—Peak load. e—Approximately. f—194,810 used by water department. g—No definite amount. h—Kilowatts. i—Cost of current for public lights, including interest and depreciation, $60,141; cost of power for water department, $16,051. j—For 11 months only. k—Also uses gas. l—Also for power for pumping station, $69,804. m—Mill refuse used. n—Figures for 1911, from report of State Gas and Electric Light Commission. o—Lignite. p—Per hour. q—12 cords of wood used, at $2 a cord.

DATA CONCERNING PRIVATE ELECTRIC LIGHT PLANTS.

Table No. 2A. Operation.

City	Fuel: Coal used, tons,	Fuel: Price	Fuel: Screenings, tons,	Fuel: Price	Other sources of power	Current: Total generated k.w.h.	Current: Used for street lights, k.w.h.	Current: Sold to commercial customers, k.w.h	Receipts: Paid or credited by city	Receipts: From commercial customers	Connected Load: No. of Public arc lamps	Connected Load: No. of commercial arc lamps	Connected Load: No. of public incandescent lamps	Connected Load: No. of commercial incandescent lamps	Connected Load: Total lighting load kw.	Connected Load: Total lighting and power load kw.
Connecticut:																
Bristol	9,000	4.15	....	....	.....	2,500,000	250,000	.....	.....	.....	147	...	15	.....	.....	.....
Illinois:																
Sparta	2,920	1.05	....	....	.....	290,000	.....	.....	1,920	9,600	...	...	100	.....	.....	100
Urbana	6,470	1.75	....	....	.....	1,010,000	156,700	843,300	8,456	56,793	137	25	200	8,000	.....	.....
Iowa:																
Dubuque	25,000	2.30	....	....	.....	.....	.....	.....	.....	.....	460	50	1	.....	.....	.....
Sheldon	1,600	4.25	....	....	.....	.....	.....	.....	.....	.....	9	...	.....	.....	.....	.....
Storm Lake	1,460	2.55	....	....	.....	.....	.....	.....	.....	.....	0	0	100	5,900	.....	.....
Kansas:																
Parsons	....	2.50	....	....	Oil & gas	.....	.....	.....	.....	.....	132	...	.....	.....	.....	.....
Maine:																
Ellsworth	....	....	....	....	Water power	2,200	.....	.....	2,547	.....	5	0	101	.....	.....	.....
Rockland	....	....	....	....	Water power	.....	.....	.....	.....	.....	120	20	24,000	96	.....	.....
Maryland:																
Frostburg	a	....	....	....	.....	a	a	a	.....	.....	50	30	130	5.000	.....	.....
Michigan:																
Marine City	....	2.60	....	....	.....	.....	.....	.....	2,700	7.043	17	0	125	3,500	.....	.....
Minnesota:																
St. Paul	....	....	30,149	4.00	Water power	19,799,055	2,435,581	12,148,200	104,249	563,738	1,187	852	1,710	246,220	11,851	19,967
Missouri:																
California	600	2.90	....	....	.....	.....	.....	.....	.....	.....	34	0	2	1,000	53	53
Nebraska:																
McCook	....	....	2,000	3.25	.....	250,000	40,000	175,000	3,000	15,000	6	1	80	5,000	100	150
New Jersey:																
Cape May	1,600	3.25	....	....	.....	.....	.....	.....	.....	.....	93	2	865	15,000	.....	.....
New Mexico:																
Roswell	....	....	....	4.85	.....	1,654,035	33.561	1,500,000	3,528	.....	32	5	25	11,694	580	1,480
New York:																
Deposit	980	3.70	....	....	Water power	.....	.....	.....	3,262	16,637	9	0	125	6,500	.....	.....
Owego	1,800	3.00	....	....	Water power	651,947	125,423	526,524	7,200	16,865	69	0	200	5,938	285	478
Schenectady	....	....	....	....	Current bought	23,759,900	1,430,983	18,987,926	.....	.....	948	548	288	289,770b	15,216	27,485
Ohio:																
Kenton	4,000	2.40	....	....	Natural gas	.....	.....	.....	.....	.....	139	50	20	.....	.....	.....
Pennsylvania:																
Corry	2,555	2.20	....	....	.....	.....	.....	.....	.....	.....	25	...	270	.....	150	250
New Castle	....	....	....	....	.....	.....	.....	.....	.....	.....	360	0	.....	.....	.....	.....
Tower City	2,236	1.50	....	....	.....	780,000	.....	.....	.....	.....	...	...	.....	.....	.....	.....
Texas:																
Corpus Christi	....	....	....	....	Fuel oil	.....	.....	.....	3 024	49,200	...	...	.....	.....	.....	.....
Gonzales	....	....	....	....	Water power	.....	.....	.....	1,200	.....	0	0	70	.....	100	150
Navasota	....	....	....	....	Midnight & fuel oil	.....	.....	.....	.....	.....	8	...	3.500	75	120	150
Wisconsin:																
Eau Claire	....	....	....	....	Water power	2,765,330	297,700	2,467,560	8,850	94,151	154	...	17	25,933	1,296	3,775
Marinette	....	....	....	....	Water power	1,179,836	165,887	814,588	7,443	46,392	121	12	2	22,365	1,171	1,790
Merrill	....	....	....	....	Water power	557,896	90,000	477 896	4,400	28,468	0	0	93	10,000	350	450
Monroe	1,594	2.87	....	....	.....	374,140	39,835	171,814	4,818	21,210	70	...	13	12,000	... ..	.....

a—No record. b—Equivalent to 16 candle power.

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS.

Table No. 3. Lamps Used.

City	Street Lighting: Kind of lamp	Nominal c.p., watts or amperes	Number used	Average useful life, hours	Rate of payment (or credit) by city, per lamp per year	Commercial Lighting: Kind of lamp	Nominal c.p., watts or amperes	Number used	Average useful life, hours
Alabama:									
Opelika	Hawthorne	6.6 amp.	155	1,050	$260.00	Carbon & Tungsten	16-80 c.p.	4,200	.....
Arkansas:									
Little Rock	Magnetite	2,500	528	.....	.....	None	.....	.....	.....
Connecticut:									
Greenwich	Enclosed arc	360 watt	40	85	100.00	Gem	30, 50 & 80 w.	.....	.....
	Mazda	60 c.p.	643	2,200	$20.00 and 24.00	.....	.....	.....	.....
	Mazda	200 c.p.	15	2,000	43.00 and 50.00	.....	.....	.....	.....
South Norwalk	Enclosed arc	350 w.	116	100–130	54.00	Carbon	35, 60 & 120 w.	19,826a	600
	Magnetite	350 w.	2	100–130	54.00	Mazda	25-250 w.	.....	800–1,000
	Mazda	50 w.	48	1,000	10.80	Enclosed arc	660 w.	.....	.....
Delaware:									
Dover	Mazda	250 w.	50	600	4,500.00b	Carbon	.....	.....	.....
	Mazda	60 w.	100	600	.....	Gem & Mazda	.....	.....	.....
Florida:									
Ocala	Enclosed arc	6.6 amp.	50	70	90.00	Mazda	60 w.	6,000	1,000
	Tungsten	100 w.	75	1.000	24.00	.....	.....	.....	.....
Georgia:									
Gainesville	Arc	6.6 amp.	100	60	1¼ cts. per k.w.h.	.....	.....	.....	.....
	Incandescent	300 w.	47	800	1¼ cts. per k.w.h.	.....	.....	.....	.....
Moultrie	Arc (Series)	6.6 amp.	12	60–65	0	.....	.....	.....	.....
	Tungsten (Series)	200 c.p.	26	6 mos.	0	.....	.....	.....	.....
	Arc (Multiple)	5 amp.	10	60	0	.....	.....	.....	.....
	Tungsten (Multiple)	150 w.	5	4–5 mos.	0	.....	.....	.....	.....
	Tungsten (Multiple)	60 w.	29	4–5 mos.	0	.....	.....	.....	.....
Illinois:									
Athens	Tungsten (Series)	75 w.	76	1,000	2 cts. per k.w.h.	.....	16 c.p.	2,200	600
Batavia	Mazda	60 w.	400	1,000	20.00	.....	.....	.....	.....
Bloomington	Tungsten (Series)	6.6 amp.	600	.....	0	.....	.....	.....	.....
Blue Island	Arc	6.6 amp.	165	90	36.00	.....	.....	.....	.....
	Tungsten	6.6 amp.	10	2,000	.....	.....	.....	.....	.....
Decatur	Flame arc	1,500 c.p.	630	300	0	.....	.....	.....	.....
	Mazda	60 w.	1,000	800	0	.....	.....	.....	.....
Hinsdale	Incandescent	60 c.p.	220	1,200	14.00	.....	.....	.....	.....
	Incandescent	40 w.	80	1,200	14.00	.....	.....	.....	.....
Lincoln	Arc (Series)	7.5 amp.	153	60	.....	Tungsten	.....	12,000	.....
Marengo	Mazda	60 c.p.	104	.....	.....	.....	.....	.....	.....
Peru	Mazda	60 w.	300	.....	.....	.....	.....	.....	.....
	Mazda	40 w.	500	.....	.....	.....	.....	.....	.....
Rochelle	Enclosed arc	6.6 amp.	50	70	6.00	Tungsten	40 & 60 w.	6,500	1,000
	Arc	6 amp.	4	80	10.00	.....	.....	.....	.....
	Tungsten	40 & 60 w	220	1,000	15.00	.....	.....	.....	.....
Shelbyville	Tungsten	100 w.	100	6 mos.	4.80	Tungsten	105 w.	100	6 mos.
	Tungsten	60 w.	700	6 mos.	4.80	Tungsten	60 w.	1,900	6 mos.
						Tungsten	40 w.	600	6 mos.
						Tungsten	25 w.	400	6 mos.
						Carbon	2-16 c.p.	400	6 mos.
Springfield	Enclosed arc	450 w.	600	85	48.50	.....	.....	.....	.....
	Magnetite	300 w.	106	260	40.00	.....	.....	.....	.....
Waterloo	.....	60 c.p.	160	12 mos.	.....	.....	16 c.p.	1,640a	12 mos.
	.....	.....	.....	.....	.....	Tungsten	40 & 60 w.	.....	.....
Iowa:									
Atlantic	Tungsten	75 w.	220	2,000	3,500.00b	Tungsten	.....	.....	.....
	Tungsten 5-light electroliers	40 w.	225	1,500	.....	.....	.....	.....	.....
Fairfield	Mazda	100 w.	210	2,000	.....	.....	.....	.....	.....
	Mazda	40 w.	160	.....	.....	.....	.....	.....	.....
	Mazda	60 w.	40	.....	.....	.....	.....	.....	.....
Mt. Pleasant	Arc	2,000 c.p.	24	100	0	.....	.....	.....	.....
	Tungsten (Series)	80 c.p.	63	1 year	0	.....	.....	.....	.....
	Tungsten (Series)	60 c.p.	31	1 year	0	.....	.....	.....	.....
	Tungsten (Multiple)	100 w.	16	1 year	0	.....	.....	.....	.....
	Carbon	16 c.p.	38	6 mos.	.....	.....	.....	.....	.....
Vinton	Incandescent	40 & 60 w.	460	.....	.....	Incandescent	.....	6,000	.....
Webster City	Mazda	500 w.	15	1,300	4,000.00b	Mazda	.....	10,000	.....
	Mazda	100 w.	39	1 200	.....	.....	.....	.....	.....
	Mazda 5-light electroliers	60 w.	251	1,000	.....	.....	.....	.....	.....
		100 & 60 w.	340	1,000	.....	.....	.....	.....	.....

Kansas:									
Council Grove	Arc (Series)	6.6 amp.	14	100	84.00				
	Mazda (Series)	6.6 amp.	70	600	28.00	Carbon & Tungsten		4,000	1,000
El Dorado	Arc (Series)	1,200 c.p.	22	76	50.00				
	Tungsten (Series)	80 c.p.	25	1,200	18.00				
	Tungsten (Multiple)	48 c.p.	150	1,000	10.00				
	Tungsten (Multiple)	32 c.p.	25	1,000	8.00				
Garnett	Arc	6 amp.	6		44.00	Mazda	40 w.	1,500	600
	Mazda	40 w.	74		18.00	Gem	16 c.p.	500	
Ottawa	Enclosed arc	6.6 amp.	26	80	78.00	None			
	Mazda	75 w.	185		12.00				
	Arc (Multiple)	6 amp.	1		78.00				
Sterling	Tungsten (Series)	32 c.p.	68	800	15.00				
	Tungsten (Series)	60 c.p.	38	800	21.00		25-150	6,000	
Topeka	Flaming arc	4 amp.	5	200		None			
	Tungsten (Series)	4 amp.	110	2,000					
	Tungsten parallel	100 w.	617	2,300					
	Tungsten parallel	60 w.	168	2,300					
Wellington	Arc	600 w.	100			Mazda	150-25		
	Mazda	100 w.	50						
Kentucky:									
Nicholasville	Arc	400 w.	60	100	40.00	Mazda			
Paris	Enclosed arc	6.6 amp.	39	90	85.00				
	Incandescent	75 w.	215						
Louisiana:									
Thibodaux	Mazda (Series)	75 w.	112		0	Mazda, Gem, Carbon		4,100	
Massachusetts:									
Ashburnham 1	Incandescent	40 w.	100			Carbon	d	400	
						Tungsten	e		
						Nernst		8	
Belmont 1	Enclosed arc	588 w.	11			Carbon	d	13,120	
	Incandescent	53 w.	298						
	Incandescent	250 w.	31						
Braintree 1	Incandescent	50 w.	595						
Chicopee	Metallic flame	1,200 c.p.	243	275					
	Mazda (Series)	40 w.	108	1,500					
Concord 1	Incandescent	50 w.	1,130			Carbon	d	16,000	
Danvers 1	Enclosed arc	525 w.	118			Carbon	d	14,399	
	Incandescent	40 w.	25			Tungsten	e	2,075	
	Incandescent	60 w.	115						
	Incandescent	75 w.	183						
Groton 1	Incandescent	50 w.	165			Carbon	d	850	
	Incandescent	40 w.	19			Tungsten	e	1,125	
Groveland 1	Incandescent	75 w.	245			Carbon	d	2,000	
Hingham 1	Arc	481 w.	6			Carbon	d	14,159	
	Incandescent	112 w.	86						
	Incandescent	50 w.	439						
Holyoke	Arc (Series)	6.6 amp.	471	90	45.00	Gem	d	64,894	
	Tungsten	125 w.	210		11.25	Tungsten	e	45,637	
	Tungsten	250 w.	15		22.50	Arc	6 amp.	352	
	Tungsten	500 w.	4		45.00				
Hudson 1	Enclosed arc	450 w.	15			Carbon	d	9,500	
	Incandescent	67 w.	26			Nernst		36	
	Incandescent	50 w.	279						
Hull 1	Incandescent	350 w.	6			Carbon	d	22,545	
	Incandescent	50 w.	537			Tungsten	e	29	
						Nernst		22	
Ipswich 1	Incandescent	60 w.	811			Carbon	d	f	
Mansfield 1	Incandescent	250 w.	31			Carbon	d	7,006	
	Incandescent	40 w.	380			Tungsten	e	f	
Marblehead 1	Enclosed arc	350 w.	172			Carbon	d	f	
	Incandescent	112 w.	39						
	Incandescent	88 w.	48						
	Incandescent	75 w.	70						
Merrimac 1	Incandescent	60 w.	310			Carbon	d	1,371	
	Incandescent	40 w.	11			Tungsten	e	57	
Middleborough	Enclosed arc	500 w.	25			Carbon	d	1,450	
	Incandescent	40 w.	202			Tungsten	e	8,000	
Millers Falls 1	Enclosed arc	726 w.	3			Carbon	d	f	
	Incandescent	40 w.	88						
No. Attleborough	Tungsten	50 w.	780	1,200	0				

For footnotes, see page 184.

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS—Lamps Used—Continued.

City	Street Lighting: Kind of lamp	Nominal c.p., watts or amperes	Number used	Average useful life, hours	Rate of payment (or credit) by city, per lamp per year	Commercial Lighting: Kind of lamp	Nominal c.p., watts or amperes	Number used	Average useful life, hours
Massachusetts—Continued.									
Norwood 1	Incandescent	75 w.	91	.....	.....	Carbon	d	5,620	.....
	Incandescent	40 w.	424	.....	.....	Tungsten	e	4,900	.....
Peabody	Enclosed arc	6.6 amp.	62	72	.....	Incandescent	50 w.	19,265	.....
	Magnetite	4 amp.	76	225	.....	.....	.....	.....	.....
	Tungsten	32 c.p.	515	.....	.....	.....	.....	.....	.....
Reading 1	Enclosed arc	480 w.	125	.....	.....	Carbon	d	18,604g	.....
	Incandescent	75 w.	99	.....	.....	.....	.....	.....	.....
	Incandescent	40 w.	102	.....	.....	.....	.....	.....	.....
Rowley 1	Incandescent	40 w.	146	.....	.....	Carbon	d	326	.....
						Tungsten	e	260	.....
Shrewsbury 1	Incandescent	40 w.	337	.....	.....	Carbon	d	1,250	.....
	.....	.....	.....	.....	.....	Tungsten	e	2,500	.....
Taunton 1	Enclosed arc	475 w.	197	.....	.....	Carbon	d	17,500	.....
	Incandescent	400 w.	3	.....	.....	Tungsten	e	2,000	.....
	Incandescent	250 w.	36	.....	.....	.....	.....	.....	.....
	Incandescent	50 w.	1,116	.....	.....	.....	.....	.....	.....
Templeton 1	Incandescent	50 w.	171	.....	.....	Carbon	d	1,900	.....
						Tungsten	e	750	.....
Wakefield 1	Enclosed arc	500 w.	48	.....	.....	.....	.....	.....	.....
	Incandescent	40 w.	320	.....	.....	.....	.....	.....	.....
	Incandescent	50 w.	429	.....	.....	.....	.....	.....	.....
Wellesley 1	Incandescent	100 w.	97	.....	.....	Carbon	d	16,100	.....
	Incandescent	75 w.	140	.....	.....	Tungsten	e	850	.....
	Incandescent	68 w.	343	.....	.....	.....	.....	.....	.....
	Incandescent	50 w.	5	.....	.....	.....	.....	.....	.....
	Incandescent	40 w.	320	.....	.....	.....	.....	.....	.....
West Boylston	Incandescent	40 w.	179	.....	.....	Carbon	d	1,040	.....
Westfield	Enclosed arc	560 w.	131	.....	.....	Carbon	d	f	.....
	Incandescent	75 w.	44	.....	.....	.....	.....	.....	.....
Michigan:									
Alpena	Metallic flame	4 amp.	136	240	50.00	.....	.....	.....	.....
Bay City	Metallic flame	4 amp.	400	300	55.00	.....	.....	.....	.....
	Magnetite	4 amp.	100	280	55.00	.....	.....	.....	.....
Marshall	Arc	6.6 amp.	81	90	25.00	.....	.....	.....	.....
	Metallic flame	4 amp.	25	280	25.00	.....	.....	.....	.....
Monroe	Arc	6.6 amp.	150	72	0	.....	.....	.....	.....
	Arc	6.9 amp.	30	.....	.....	.....	.....	.....	.....
Niles	Arc	.....	86	.....	7,000.00b	.....	.....	.....	.....
St. Clair	Enclosed arc	7.7 amp.	34	.....	28.26	.....	.....	.....	.....
	Mazda (Series)	250 w.	13	.....	28.26	.....	.....	.....	.....
	Tungsten (Multiple)	60 w.	12	.....	28.26	.....	.....	.....	.....
Minnesota:									
Fairmount	Arc	600 w.	13	80	72.00	Gem	16 c.p.	5,000	500
	Mazda	60 w.	.....	1,200	18.00	Mazda	32 c.p.	2,500	900
						Mazda	50 c.p.	1,000	1,200
						Mazda	80 c.p.	500	1,500
Lake City	Mazda	350 c.p.	17	1,200	50.00	Carbon & Mazda	2-100	5,000	1,200
	Arc	1,200 c.p.	40	.....	50.00	.....	.....	.....	.....
	Arc	1,400 c.p.	20	.....	50.00	.....	.....	.....	.....
Montevideo	Tungsten	60 w.	121	.....	14.60	.....	.....	.....	.....
	Arc	6.6 amp.	10	.....	72.00	.....	.....	.....	.....
Rochester	Arc	6.6 amp.	135	70	65.00	.....	.....	.....	.....
Shakopee	Arc	6.6 amp.	100	.....	.....	.....	.....	.....	.....
Mississippi:									
Greenwood	Arc	6.6 amp.	60	75	100.00	Mazda	25-40	.....	700
	...rsten (Series)	6.6 amp.	12	1,000	50.00	.....	.....	.....	.....
Kosciusko	Incandescent	32 c.p.	150	.....	12.00	.....	.....	.....	.....
	Arc	6.6 amp.	22	100	84.00	.....	.....	.....	.....
Yazoo City	Enclosed arc	475 c.p.	72	100	96.00	.....	.....	.....	.....
	Tungsten (Series)	225 c.p.	10	800	36.00	.....	.....	.....	.....
Missouri:									
Bethany	Mazda	80 w.	.....	2 000	18.00	.....	.....	.....	.....
Butler	Arc	400 c.p.	4	.....	.....	.....	.....	.....	.....
	Mazda	250 w.	20	.....	.....	.....	.....	.....	.....
	Mazda	60 w.	105	.....	.....	.....	.....	.....	.....
Cameron	Mazda (Series)	60 c.p.	171	5,000	.....	.....	.....	.....	.....
	Mazda (Mult.)	80 c.p.	54	6,500	.....	.....	.....	.....	.....
Fulton	Mazda	50 c.p.	140	1,000	0	Tungsten & Carbon	.....	20,000	.....
	Arc	1,200 c.p.	20	70	0	.....	.....	.....	.....
Lamar	Mazda	60 w.	80	.....	0	.....	.....	.....	.....
	Mazda	6.6 amp.	130	.....	0	.....	.....	.....	.....
Mexico	Arc	6.6 amp.	80	.....	51.00	.....	.....	.....	.....
Monroe City	Mazda	100 w.	95	.....	.....	.....	.....	.....	.....
Slater	Incandescent	100 w.	75	1,500	.....	Mazda, Carbon, Gem.	.....	5,000	.....

Nebraska:									
Crete	Arc	6.6 amp.	30	.....	6 cts. per k.w.h.	.....	.....	.....	.....
	Mazda	250 w.	26	.....	6 cts. per k.w.h.	.....	.....	.....	.....
Hastings	Mazda (Series)	32 c.p.	200	2,000	.....	Mazda	.....	.....	.....
	Mazda (Series)	250 c.p.	60	1,200	.....	.....	.....	.....	.....
	Arc	6.6 amp.	30	40	.....	.....	.....	.....	.....
Schuyler	Mazda	25 w.	160	6 mos.	0	.....	.....	.....	.....
	Mazda electroliers	40 w.	140	8 mos.	0	.....	.....	.....	.....
	Mazda electroliers	60 w.	35	12 mos.	0	.....	.....	.....	.....
Tecumseh	.....	6.6 amp.	90	12 mos.	16.32	.....	.....	.....	.....
	.....	40 w.	115	2½ mos.	.....	.....	.....	.....	.....
	.....	250 w.	1	3 mos.	.....	.....	.....	.....	.....
New Jersey:									
Orange	Magnetite	4 amp.	372	200	57.00	None	.....	.....	.....
	Mazda	60 c.p.	185	.....	14.25	.....	.....	.....	.....
Washington	Incandescent	40 w.	41	3,000	18.00	Carbon	10-120 w.	3,508	.....
	Incandescent	75 w.	26	3,000	21.50	Tungsten	40 w.	476	.....
	Enclosed arc	5.5 amp.	40	80	69.00	Arc	650 w.	2	80
						Arc	350 w.	40	80
New York:									
Bath	Metallic flame	4 amp.	72	225	69.44				
Canajoharie	Tungsten (Series)	100 c.p.	200	6 mos.	20.00	Mazda	20-150 w.	3,400	700
Canastota	Arc	6.6 amp.	58	60	.....	.....	.....	.....	.....
	Tungsten	6.6 amp.	63	500	.....	.....	.....	.....	.....
Fairport	Enclosed arc	450 c.p.	73	70	55.00	.....	.....	.....	.....
	Mazda	100 c.p.	26	1,000	18.00	.....	.....	.....	.....
Mohawk	Arc	500 w.	25	100	60.50	.....	.....	.....	.....
	Incandescent	250 w.	27	4 mos.	30.00	.....	.....	.....	.....
Solvay	Tungsten	75 w.	215	4,000	2,000.00b	Carbon & Tungsten	.....	6,000	.....
North Carolina:									
Elizabeth City	Incandescent	40 w.	264	1,500	16.66	.....	.....	.....	.....
	Arc (Series)	480 w.	41	54	72.00	.....	.....	.....	.....
Gastonia	Metallic flame	4 amp.	20	200	.....	.....	.....	.....	.....
	Mazda	200 c.p.	67	.....	.....	.....	.....	.....	.....
	Mazda	100 c.p.	118	.....	.....	.....	.....	.....	.....
North Dakota:									
Wahpeton	Magnetite	4 amp.	32	150	120.00	Carbon	10 & 20 w.	.....	1,000
	Mazda (Multiple)	250 w.	4	1,500	60.00	Mazda	5-500 w.	.....	1,000
	Mazda (Series)	100 w.	4	1,000	30.00	.....	.....	.....	.....
Ohio:									
Celina	Arc	6.2 amp.	80	56	75.00	.....	.....	.....	.....
	Mazda	6.2 amp.	10	.....	75.00	.....	.....	.....	.....
Hamilton	Arc (Series)	500 w.	365	85	0	Arc	600 w.	80	95
	Incandescent	75 w.	451	3 mos.	.....	.....	.....	.....	.....
Lisbon	Incandescent	40 c.p.	80	1,350	.....	.....	.....	.....	.....
	Incandescent	60 c.p.	80	1,350	.....	.....	.....	.....	.....
	Incandescent	100 c.p.	8	1,350	.....	.....	.....	.....	.....
Miamisburg	Arc	6.6 amp.	99	900	40.00	.....	.....	.....	.....
	Mazda	100 & 60 w.	9,600	.....	12.00 and 10.00	.....	.....	.....	.....
Niles	Incandescent	100 w.	335	1,500	0	Mazda	25-250 w.	5,000	1,500
	Incandescent	60 w.	230	1,500	0	.....	.....	.....	.....
	Incandescent	250 w.	50	1,500	0	.....	.....	.....	.....
	Arc	6.6 amp.	110	50	0	.....	.....	.....	.....
Wapakoneta	Arc	9.6 amp.	89	14	27.00	Carbon & Tungsten	.....	.....	.....
	Tungsten (Series)	100 w.	9	.....	.....	.....	.....	.....	.....
Oklahoma:									
Durant	Luminous arc	320 w.	50	200	84.00	Mazda, Tungsten, Carbon	100-500	.....	.....
Edmond	Arc	1,200 c.p.	17	60	72.00	.....	.....	.....	.....
	Tungsten	250 c.p.	37	800	30.00	.....	.....	.....	.....
Enid	Arc (Series)	7.5 amp.	139	.....	66.00	Arc (Multiple)	6 amp.	39	.....
Vinita	Flaming arc	6.6 amp.	8	.....	96.00	.....	.....	.....	.....
	Tungsten	40 w.	4	4,000	18.00	.....	.....	.....	.....
	Tungsten	250 w.	60	4,000	42.00m	.....	.....	.....	.....
Pennsylvania:									
Coatesville	Enclosed arc	7.5 amp.	75	.....	62.50	.....	.....	.....	.....
	Metallic flame	4 amp.	25	.....	62.50	.....	.....	.....	.....
Doylestown	Enclosed arc	6.6 amp.	56	100	72.00	.....	.....	.....	.....
	Incandescent (Series)	6.6 amp.	61	800	35.00	.....	.....	.....	.....
Easton	Arc	300 w.	316	.....	55.00	.....	.....	.....	.....
Ephrata	Arc	7.5 amp.	38	.....	50.00	.....	.....	.....	.....
Mauch Chunk	Magnetite	4 amp.	32	180	75.00	Incandescent	.....	12,500	800
	Tungsten	60 w.	85	.....	23.00	.....	.....	.....	.....
Media	Mazda	40 w.	50	.....	.....	.....	.....	.....	.....
	Enclosed arc	2,000 c.p.	100	100	.....	.....	.....	.....	.....
	Mazda	150 w.	10	.....	.....	.....	.....	.....	.....
Norristown	Metallic flame	300 w.	231	220	.....	None	.....	.....	.....

For footnotes, see page **184.**

DATA CONCERNING MUNICIPAL ELECTRIC LIGHT PLANTS—Lamps Used—Continued.

City	Kind of lamp	Street Lighting: Nominal c.p., watts or amperes	Number used	Average useful life, hours	Rate of payment (or credit) by city, per lamp per year	Kind of lamp	Commercial Lighting: Nominal c.p., watts or amperes	Number used	Average useful life, hours
South Carolina:									
Abbeville	Magnetite	1,500 c.p.	68	3,650	60.00	Mazda	.....	.....	500
	Mazda	60 c.p.	30	.....	15.00	.....	.....	.....	.....
Florence	Enclosed arc	500 w.	78	56	69.00	Gem	.....	6,000	.....
	Mazda	40 w.	38	12 mos.	20.00	Mazda	.....	6,000	.....
Rock Hill	Magnetite	4 amp.	88	175	50.00	Mazda	.....	.....	.....
South Dakota:									
Sioux Falls	Arc	6.6 amp.	226	70	32.50	.....	.....	.....	.....
Tennessee:									
Dyersburg	Arc	1,200 c.p.	15	100	50.00	Tungsten & Carbon	.....	.....	.....
	Incandescent (Series)	200 c.p.	60	1,000	20.00	.....	.....	.....	.....
Jackson	Magnetite	4 amp.	160	300	45.00	.....	.....	.....	.....
Texas:									
Fort Worth	Magnetite	290 w.	730	200	.....	.....	.....	.....	.....
	Tungsten	75 w.	300	.....	....	.....	.....	.....	.....
	Tungsten, 5-light electroliers	60 & 100 w.	320	.....	.....	.....	.....	.....	.....
Galveston	Magnetite	320 w.	380	190h	65.00	.....	.....	.....	.....
	Mazda	60 w.	240	.....	2½ cts. per k.w.h.	.....	.....	.....	.....
	Mazda	100 w.	60	.....	2½ cts. per k.w.h.	.....	.....	.....	.....
Utah:									
Springville	Carbon Incande.	120 w.	140	3 mos.	.....	.....	.....	.....	.....
	Tungsten	100 w.	30	.....	.....	.....	.....	.....	.....
Virginia:									
Richmond	Enclosed arc	500 w.	1,148	70	37.68	Mazda	40 w.	1,557	.....
	Flame arc	500 w.	72	70	50.04i	.....	.....	.....	.....
	Incandescent (Series)	80 c.p.	1,063	1,700	12.53j	.....	.....	.....	.....
Washington:									
Seattle	Enc. arc (Series)	475 w.	712	50	54.00	Enc. arc (Mult.)	475 w.	94	60
	Tungsten	350 w.	217	2,870	54.00	Carbon Incandescent	55 w.	283,510k	.....
	Tungsten	50 w.	5,876	3,010	13.80	.....	.....	.....	.....
	Tungsten clusters	50 w.	7,305	2,800	8.40	.....	.....	.....	.....
Wisconsin:									
Fort Atkinson	Tungsten	40-6 w.	150	.....	4,000.00b	.....	.....	.....	.....
	Gem	40-60 w.	300	.....	.....	.....	.....	.....	.....
Oconomowoc	Arc	6.6 amp.	51	80	96.00	Mazda & Carbon	30-300	8,624	1,000
	Mazda	6.6 amp.	52	1,000	24.00	.....	.....	.....	.....
Canada:									
Kingston, Ont.	Magnetite	2,000 c.p.	138	150	60.00	.....	.....	.....	.....
	Enclosed arc	2,000 c.p.	46	100	60.00	.....	.....	.....	.....
	Tungsten	100 w.	26	.....	20.00	.....	.....	.....	.....
Victoria, B. C.	Magnetite	4 amp.	550	200	.....	.....	.....	.....	.....
	Enclosed arc	7.5 amp.	200	75	.....	.....	.....	.....	.....
	5-lamp standards	50 w.	1,000	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	Luminous arc	6.6 amp.	890	130	.....	.....	.....	.....	.....
	Magnetite	6.6 amp.	90	130	.....	.....	.....	.....	.....
	Enclosed arc	7.5 amp.	990	95	.....	.....	.....	.....	.....
	Incandescent (Series)	250 w.	40	1,250	.....	.....	.....	.....	.....
	Incandescent (Series)	100 w.	158	1,500	.....	.....	.....	.....	.....
	Incandescent (Mult.)	600-100 w.	244	.....	.....	.....	.....	.....	.....

a—Includes all commercial lamps. b—For all street lamps. c—For all night service, $60 for moonlight. d—Number given in 50-watt units. e—Number given in 40-watt units. f—No record. g—Includes Tungsten lamps. h—Lower carbon, upper carbon burns 5,000 hours. i—Also 50 similar lamps with underground wires at $82.20. j—For all night service; $11.24 for service to 1 a. m. with underground wires. k—16 c.p. equivalents. l—Figures for 1911 from report of the Massachusetts Gas & Electric Light Commissioners. m—Bracket suspension; $48 for centre suspended lamps.

DATA CONCERNING PRIVATE ELECTRIC LIGHT PLANTS.

Table No. 3A. Lamps Used.

City	Kind of lamp	Street Lighting: Nominal c.p., watts or amperes	Number used	Average useful life, hours	Rate of payment (or credit) by city, per lamp per year	Kind of lamp	Commercial Lighting: Nominal c.p., watts or amperes	Number used	Average useful life, hours
Connecticut:									
Bristol	Enclosed arc	510 w.	147	85	$80.00a	.....	.....	.....	.....
Illinois:									
Sparta	Tungsten	40 w.	85	12 mos.	10.00b	Tungsten	40 w.	.....	.....
	Tungsten	400 w.	15	.....	.....	Tungsten	32 w.	.....	.....
Urbana	Arc	6.6 amp.	137	100	65.00	Arc	6.6 amp.	25	100

Iowa:									
Dubuque	Arc	1,200 c.p.	460	70	60.00b				
Sheldon	Tungsten	60 w.	60	.....	21.00				
	Arc	.....	9	.....	72.00				
Storm Lake	Gem	50 w.	90	.....	9.00c				
	Tungsten	60 w.	25	.....	8 cts. per k.w.h.				
	Tungsten	40 w.	100	.....	8 cts. per k.w.h.				
Kansas:									
Parsons	Enclosed arc	6.6 amp.	132	.....	.....	Mazda	.....	.....	.....
Maine:									
Rockland	Magnetite	400 w.	120	175	3.5 to 1.9 per k.w.h.				
	Mazda	75 w.	96	.....	3.5 to 1.9 per k.w.h.				
Maryland:									
Frostburg	Arc	6.5 amp.	50	.....	68.00				
	Mazda	60 w.	130	.....	16.80				
Michigan:									
Marine City	Enclosed arc	450 w.	17	75	48.00				
	Incandescent	60 w.	60	.....	17.50				
	Incandescent	40 w.	65	.....	10.50				
Minnesota:									
St. Paul	Flame arc (Series)	510 w.	398	90	90.00				
	Flame arc (Mult.)	750 w.	102	90	90.00				
	Enc. arc (Series)	430 w.	673	70	67.50				
	Enc. arc (Mult.)	550 w.	12	70	67.50				
	Enc. arc (Mult.)	700 w.	2	70	90.00				
	5-lamp standards	60 & 150 w.	1,710	1,200	75.00				
Missouri:									
California	Enclosed arc	450 w.	34	80	70.00	Gem	50 w.	300	800
	Tungsten	100 c.p.	2	1,000	2.50	Tungsten	40 w.	300	800
						Tungsten	60 w.	150	800
						Tungsten	100 w.	100	1,200
Nebraska:									
McCook	Tungsten	60 w.	80	.....	18.00				
	Arc	6.6 amp.	6	50	108.00				
New Jersey:									
Cape May	Arc	550 w.	93	90	.....				
	Mazda	100 w.	65	500	.....				
New Mexico:									
Roswell	Arc (Series)	6.6 amp.	32	100	96.00				
	Mazda	100 w.	25	.....	32.00				
New York:									
Deposit	Arc	500 w.	9	.....	70.00				
	Mazda	400 w.	6	7 mos.	65.00				
	Mazda	250 w.	19	6 mos.	37.50				
	Mazda	40 w.	100	5 mos.	15.00				
Owego	Mazda	100 w.	40	.....	18.00	Mazda & carbon	[illegible] w.	5,938	1,000
	5-light standards	60 w.	160	.....	9.84	.....	.....	.....	.....
Schenectady	Arc	300 w.	948	185	60.00	Arc	4-6.6 amp.	548	.....
	Incandescent	60 w.	.....	.....	18.00	Flame	10-12 amp.	105	.....
	Incandescent	40 w.	.....	.....	16.00	.....	.....	.....	.....
Ohio:									
Kenton	Enclosed arc	7.5 amp.	130	.....	.....	.....	.....	.....	.....
	Tungsten	250 w.	.....	.....	.....	.....	.....	.....	.....
Pennsylvania:									
Corry	Arc	270 w.	25	175	52.20	.....	.....	.....	.....
	Mazda	60 c.p.	270	1,000	13.50	.....	.....	.....	.....
New Castle	Enclosed arc	500 w.	360	.....	75.00d	.....	.....	.....	.....
Tower City	Tungsten	250 w.	25	.....	45.00	.....	.....	.....	.....
	Tungsten	100 w.	20	.....	30.00	.....	.....	.....	.....
	Tungsten	25 w.	52	.....	10.00	.....	.....	.....	.....
	Tungsten	40 w.	11	.....	20.00	.....	.....	.....	.....
	Incandescent	16 c.p.	53	.....	10.00	.....	.....	.....	.....
	Arc (Multiple)	7 amp.	14	.....	55.00	.....	.....	.....	.....
Texas:									
Corpus Christi	Mazda	250 w.	11	.....	84.00	.....	.....	.....	.....
	Mazda	40 w.	154	.....	18.00	.....	.....	.....	.....
Wisconsin:									
Eau Claire	Arc	2,000 c.p.	154	100	56.40	Incandescent	.....	25,933e	.....
Marinette	Enclosed arc	6.6 amp.	91	.....	61.50	Enclosed arc	6 amp.	12	.....
	Metallic flame	4 amp.	30	.....	61.50	Incandescent	.....	22,365e	.....
	Incandescent	32 c.p.	1	.....	23.00	.....	.....	.....	.....
Merrill	Mazda	200 c.p.	93	1,500	48.00	.....	.....	.....	.....
Monroe	Luminous arc	320 w.	70	220	65.00	.....	.....	.....	.....

a—For all night; $65.00 for midnight moonlight schedule. b—Moonlight schedule. c—Till midnight. d—$70 for all over 200. e—50-watt units.

MUNICIPAL ELECTRIC LIGHT PLANTS

TABLE NO. 4.—COMMERCIAL LIGHTING RATES.

City.	Maximum rate in cents per k. w. h.	Maximum k. w. h. to which this rate applies.	Minimum rate in cents. per k. w. h.	Minimum k. w. h. to which this rate applies.
Alabama:				
Opelika	12	100	...	...
Connecticut:				
Greenwich	15	50	10	600a
South Norwalk	9	100	5	500
Delaware:				
Dover	6c	...	...	...
Florida:				
Ocala	8	500	5	2,000
Georgia:				
Moultrie	10c	...	...	...
Illinois:				
Athens	12c	...	...	...
Lincoln	11	d	8	...
Marengo	13½	...	10	...
Rochelle	10c	...	...	...
Shelbyville	12	100	7	200
Iowa:				
Atlantic	10	10	6	40
Mt. Pleasant	10	25	6	80
Vinton	12	...	4	...
Webster City	10	e	5	...
Winterset	10c	...	...	...
Kansas:				
Council Grove	12	80	6	240
El Dorado	13	...	5	500
Garnett	10	20	5	...
Olathe	10	...	3	500
Ottawa	10	23	4	501
Sterling	15	...	7½	...
Kentucky:				
Nicholasville	7½	...	...	...
Louisiana:				
Thibodaux	10	150	5	250
Massachusetts:				
Ashburnham f	15	...	10	...
Belmont f	15c	...	...	...
Braintree f	12c	...	...	...
Chicopee f	12	...	4	...
Concord f	9c	...	...	...
Danvers f	11c	...	...	...
Groton f	16	...	13	...
Groveland f	13c	...	...	...
Hingham f	10c	...	...	...
Holyoke	6c	...	...	...
Hudson f	20c	...	...	...
Hull f	25c	...	...	...
Ipswich f	12c	...	...	...
Mansfield f	15c	...	...	...
Marblehead f	15c	...	...	...
Merrimac f	20c	...	...	...
Middleborough f	15c	...	...	...
Millers Falls f	15c	...	...	...
No. Attleborough	13½c	...	...	...
Norwood f	11	...	5	500
Peabody	13c	...	...	...
Reading f	15c	...	...	...
Rowley f	18c	...	...	...
Shrewsbury f	15c	...	...	...
Taunton f	14c	...	...	...
Templeton f	15c	...	...	...
Wakefield f	18c	...	...	...
Wellesley	10c	...	...	...
West Boylston f	12c	...	...	...
Westfield f	12c	...	...	...
Michigan:				
Bay City	12	25	6	400
Marshall	5c	...	...	...
Monroe	10	...	...	...
Niles	10c	...	...	...
St. Clair	10	100	6	400
Minnesota:				
Fairmont	12c	...	...	...
Lake City	12	...	8	...
Montevideo	13	...	7	...
Moorhead	8	200	4	1,000
Rochester	10	50	6	300
Shakopee	10c	...	...	...
Mississippi:				
Canton	10	50	8	100
Greenwood	12	...	3	...
Yazoo City	10	30	9	201
Missouri:				
Butler	100	...	5	...
Cameron	10	74	6	250
Fulton	12	20	6	310
Lamar	12½	...	5	...
Slater	10	23	6	231
Unionville	15	...	...	...
Nebraska:				
Crete	10	50	6	75
Hastings	12	25	4½	3,000
New Jersey:				
Washington	13.75	32.3	7.5	533.3
New York:				
Bath	16.2	40	10.8	301
Canajoharie	10	30	6	30
Fairport	8	10	6.4	150
Mohawk	10	...	6	20
Solvay	8	50	5	150
North Carolina:				
Gastonia	10	...	7	...
North Dakota:				
Wahpeton	12g	32†	3g	64†
Ohio:				
Celina	10	...	...	...
Miamisburg	10	...	...	...
Niles	8	100	4	150
Wapakoneta	7½h	...	...	...
Oklahoma:				
Durant	10	...	7	...
Edmond	12½	50	10	50
Enid	15	35	4.5	2,500
Vinita	15	30†	4	330†
Pennsylvania:				
Coatesville	10	7½	5	7½
Ephrata	10	...	...	...
Mauch Chunk	18	...	12	...
South Carolina:				
Abbeville	10	100	8	100
Florence	12.8	10	8½	50
Greenwood	10	100	8	100
Rock Hill	10	15	8	100
Washington:				
Seattle	6	60	4	60
Wisconsin:				
Ft. Atkinson	12	10	4	8,000i
Oconomowoc	10	10,000	8	...
Canada:				
Winnipeg, Man	3⅓j	...	...	...

†Hours. a—Also readiness to serve charge of $4 per kw., plus 5 cents per k. w. h. c—Applies to all quantities. d—For first 30 hours per month. e—For first 60 hours on full load. f—Rates for 1911 from report of Massachusetts Gas & Electric Light Commissioners. g—Plus fixed charge of ½ cent per c. p. on active lights. h—Discount of 10 per cent. up to $5, and 40 per cent. for over $40. i—Yearly. j—20 per cent. discount for $25 to $50 a month, 60 per cent. for over $500.

Most of rates given are subject to a cash discount, in most, but not all, cases 10%. The information given on this point was so incomplete that no attempt is made to include it in the table.

PRIVATE ELECTRIC LIGHT PLANTS

TABLE NO. 4A.—COMMERCIAL LIGHTING RATES.

City.	Maximum rate in cents per k. w. h.	Maximum k. w. h. to which this rate applies.	Minimum rate in cents. per k. w. h.	Minimum k. w. h. to which this rate applies.
Illinois:				
Sparta	10	...	8	...
Urbana	15	...	6	...
Iowa:				
Storm Lake	15a	...	...	...
Maine:				
Rockland	12	6	8	1,000
Michigan:				
Marine City	12	30†	6	...
Minnesota:				
St. Paul	10	100	5½	600
Missouri:				
California	15	20	3	1,000
Nebraska:				
McCook	14	15	7b	300
New Mexico:				
Roswell	14	50†	7	50†
New York:				
Owego	15	3*	5	16*
Schenectady	10	30	3½	5,500
Pennsylvania				
New Castle	12	40†	5½	...
Texas:				
Corpus Christi	15	...	4	...
Wisconsin:				
Marinette	10	30†	4	90†
Merrill	12	...	3	...
Monroe	15	20	6	50

*Per lamp. †Hours. a—Discount of 16⅔ per cent. for over 25 kilowatts, 33⅓ per cent. for over 100. b—Plus a constant of $8.30.

NEWS of the MUNICIPALITIES

Current Subjects of General Interest Under Consideration

by City Governments and Department Heads

ROADS AND PAVEMENTS

Pennsylvania's Extensive State Roads.

Harrisburg, Pa.—State road building, delayed by lack of necessary fund legislation, is to be resumed on a large scale. Among others, the Pennsylvania Motor Federation is urging the approval of the $40,000,000 road bond amendment to the State Constitution, which will be submitted to the people at the polls in November next, having already been approved by two Legislatures. The bond issue will provide funds not only sufficient but sure, and not leave the building of a great system of modern roads at the mercy of legislative caprice. The proceeds of the bond issue will not become available until after the Legislature of 1915 has passed the necessary enabling act, Governor Tener having declared he has no intention of calling a special session next winter. Meantime, the demands on the State Highway Department for the construction and repair of roads all over the State are far in excess of its ability to meet by reason of the limited amount of money that can be diverted from the public revenues for that purpose. An interesting feature of this year's contracts is that wherever possible the department has chosen work that will connect existing stretches of improved highway or extend pieces of road previously improved. Each section is designed to fit into the general scheme of a comprehensive system of main highways. A notable instance of this is found in two sections of Route No. 5, which extends from Scranton to Wilkes-Barre by way of Pittston. One section contains 11,622 feet and the other 24,435 feet. They will connect municipalities that have improved their streets. As a result there will be in a short time a continuous improved highway between the county seats of Lackawanna and Luzerne counties.

Improving Road into Virginia.

Virginia, Minn.—Nichols township, which is doing a lot of road work, has installed a No. 3 stone crusher at an expense of $3,000 at the gravel pit on the Mud Lake road near the Virginia-Mountain Iron road. The township board has let the contract for two cement bridges over the branches of East Two Rivers to Harvey & Erickson of Virginia, and these are being built. The township owns an eighty near Virginia which has one of the best gravel pits for road building purposes on the range and considerable revenue is derived from it in addition to supplying the township with road material. The city of Virginia has agreed to build a mile of the Wolf road, outside of the city limits, to meet what the township and the county will construct, and the road is expected to be open for traffic to a section of country in which are three hundred farmers, who can now come to Virginia only by the roundabout way through Eveleth and by traversing up and down in both directions the great Eveleth hill, which has a grade of a mile on both sides.

Street Improvements Total Thirty Miles.

Salt Lake City, Utah.—More than thirty miles of paving, curb and guttering and sewer work is under way in Salt Lake now, according to report of the Commissioner of Streets and Public Improvements. All of this work is under contract to be completed this year. Of this amount eight miles is paving, sixteen miles curb and guttering, and about six miles in sewer, while several miles of surfacing and other work is going on. G. A. Hernan has begun work laying the surfacing on Third West and this is to be rushed through as rapidly as possible.

Road Making Exhibitions

New Hampton, Ia.—W. P. Strayer, a member of the county board, was among the 1,500 people who witnessed a contest of six tractors and two graders near the city. A fifty-foot road, thirty feet wide, sloping to a ditch on each side and graded on the outside of the ditches, was completed at a cost of $28 a mile. The result was the purchasing of outfits by the county boards from Butler and Bremer.

Tucker Station, Ia.—Supervisor James Uhl made the arrangements for a demonstration of road-making at which supervisors from other counties and trustees from Polk county were present. A big Twin City tractor, pulling two Adams road graders, converted two miles of road into a perfect dirt highway.

Fort Dodge, Ia.—The International Harvester Company has been conducting a road making demonstration on the road to Badger, three miles north of Fort Dodge. Members of the County Board of Supervisors, County Road Engineers and good road boosters generally were on the scene to watch the building of one mile of road. A sixty horse-power traction engine is used to haul a grader. Ditches are cut on either side with the machine and the road is crowned in the most approved style. The demonstration is to show the supervisors the superiority of machine road work over that of men and teams.

Highway Agent Inspects Road.

Franklin, N. H.—A representative from the State Highway Department has been looking over the proposed new state road to be built within the city limits. The amount of $4,700 has been appropriated for the state road work this year, and it has been practically decided that it will be expended on what is called the River road, an extension of Main street toward Hill. Last year a stretch of about half a mile of macadam was laid on this road, the first that had ever been built in this direction. Automobilists who travel over this road riding between Plymouth and this city, declare it to be the worst piece of highway on the route. The town of Hill has improved most of the road within its jurisdiction, and the town of Bristol also has a good stretch of macadam. The Bridgewater and Plymouth sections, beyond Bristol, are in fair condition and when the Franklin portion is improved it is expected that much automobile travel through the center of the state will go over this highway, as it is the shortest and most direct route up the Pamigewasset valley to the mountains.

Walden's Streets Oiled.

Walden, N. Y.—Practically all the principal streets in the village have been treated with oil, put on under pressure by the Standard Oil Company's high pressure automobile tank wagon and as a result the dust problem has been effectually settled for the summer. All the principal streets were placed in good condition before the oil was applied. Valley avenue has been recently graveled and rolled down and with its coating of road oil is now one of the finest streets in the village.

Convict Labor on Conchise Roads.

Bisbee, Ariz.—B. M. Atwood will make this city his headquarters in supervising the extensive work on the Conchise county roads. Work will be begun on the Tombstone road from that divide, two miles from Bisbee, towards the county seat, and repairing will be carried on on the Bisbee-Douglas road, convict labor being employed.

Good Roads Day Set by Governor.

Birmingham, Ala.—Every citizen of Alabama is urged by Governor O'Neal to contribute money or labor to the cause of good roads on Anugust 14, 15 and 16. These dates were set aside as "Good Roads Days" by the Governor in a proclamation.

"Let each county vie with the other in this important undertaking," urged the Governor. "Let our people imitate the example set by other states, where lawyers, doctors, bankers, merchants and all classes of people contributed from one to three days labor to the improvement of the roads within their counties and by which methods splendid results have been achieved." Probate Judges are urged by the Governor to designate some section of the public road in the county to be improved during the three days.

Patrol New Roads to Repair Defects.

Stockton, Cal.—San Joaquin county has adopted a consistent method of keeping up its improved highways. When the people voted $2,000,000 a few years ago for the improvement of the roads they were promised they would be maintained by the county after completion. The mileage improved is 238. The county has employed a maintenance department to look after the work, and regular patrols are maintained and as fast as any wear or tear is discovered repairs are made.

Gravel Land for Paving at $250 An Acre.

Pueblo, Colo.—The city commissioners have purchased 20 acres of gravel land in the Central Park section for $5,000 and it is the intention of the committee, Asbury White, C. K. McHarg, G. L. L. Gann and George Meston to use the gravel for improving streets.

SEWERAGE AND SANITATION

City Regulates Drug Traffic and Pure Food Laws.

Schenectady, N. Y.—The Common Council has adopted an ordinance, introduced by Alderman Dancy, regulating the cocaine traffic by prohibiting the selling of drugs at retail except by a registered druggist and only in minimum quantities for medicinal purposes. Dr. B. H. Kirschberg, city chemist, has uncovered a traffic in drugs alarming in its extent, and steps were taken to stamp it out. There was also introduced an amendment to the city's pure food law, which provides that bakers must equip their delivery wagons with dust and fly-proof containers for handling bread, cakes and pies; that no person with a skin or contagious disease be allowed to work in a bakery, meat market, etc.; that testing, handling and smelling of food products by prospective customers must be stopped; and that wrapping food products in newspapers or old sacks must be prohibited.

"Pure Food" Inspection in Arizona Cities.

Bisbee, Ariz.—Arizona is the only state that has a pure food law, and Miss Jane H. Rider is making a tour of inspection of the cities under the direct supervision of Dr. Looney, head of the state health department. She has just inspected this city and reports excellent sanitary conditions. Douglas will be the next city inspected.

Mosquito War Methods.

Baltimore, Md.—The Health Department has issued valuable information in mosquito extermination means and the citizens are responding actively. The department's disinfecting force is covering with coal oil all the nesting places and after rains are resprinkling them. A small spray is the most effective instrument. The edges of window screens are first sprayed, and then a cloud of oil is shot out of each window. Dr. John S. Fulton, secretary of the State Board of Health, suggests asphyxiation as a method of suppression. A small quantity of pyrethrum is placed in a vessel and covered with a little alcohol, which is carefully lighted. The pyrethrum is thus fired, and the windows being closed, the whole room is filled with the fumes. The mosquitoes fall to the floor in a stupor and must be swept out immediately to make the plan effective.

A Sewerage Measuring Station.

Newark, N. J.—The Passaic Valley Sewerage Commission has acquired 30,000 square feet of land fronting on Riverside avenue on the Second River, on which will be erected a station to measure all the sewage that flows into the big intercepting flume from the upstream municipalities. Its maintenance will be paid for on the basis of service by each of the municipalities using it. Besides the large one at the Newark boundary line, there will be another one below the pumping station which will measure the total, and each municipality will have a separate one of its own, excepting Newark. The extent of Newark's use of the sewer will be computed by subtracting the total of those outside of the city from the total passing through the station on the meadows.

Tree Roots Cause Drain Troubles.

St. Augustine, Fla.—It has been discovered that the flooding of San Marco avenue after rains was due to the clogging up of the drains by large tree roots. A thorough investigation was made by digging down to the storm sewer from the catchbasin, and tree roots, some of them 10 inches in diameter, were found and removed.

WATER SUPPLY

Offers to Sell Water Works to City.

Valley Junction, Ia.—In a franchise submitted to the Council, the Des Moines Electric Company offers to sell the entire water works system, including the boilers, pumps, mains and real estate, for $10,000. The offer is favorably received by the members of the Council, as the plant has been formally appraised by the Turner Improvement Company, and checked by J. C. Chase, at $15,000. As the city officials had been intending to purchase the mains and only a part of the equipment for $8,000, it is probable that they will accept the offer of the company.

Rapid Work on Filter Plant.

Youngstown, O.—Construction work on the big settling basins for the filter plant annex is progressing at a good rate, as seen in the illustration. Concrete work and steel

Courtesy Youngstown Telegram.
YOUNGSTOWN FILTER PLANT.

reinforcing, with distributing systems on a large scale, are being used throughout. The big outlet pipe has been installed and other details of the beds and pipes are being hurried. When completed the improvement will give the plant a total daily filtering capacity of 20,000,000 gallons.

City Watershed Inspection.

Ithaca, N. Y.—The city of Ithaca has been ordered by the State Department of Health to make a special inspection of the watershed of Six-Mile Creek, from which the city water system is obtained. The department stipulates that in accordance with the law the watershed must be carefully inspected to determine if it is free from all unsanitary buildings or other sources of disease which might affect the water.

STREET LIGHTING AND POWER

New Lighting Board for Philadelphia.

Philadelphia, Pa.—To provide a more efficient lighting system for the city, which has been under the control of three separate bureaus, under two different directors, Mayor Blankenburg has determined to form a new board composed of the present chiefs of the bureaus having to do with lights. Mayor Blankenburg has appointed as members of the new board, which will be known as the board of lighting supervisors, Clayton W. Pike, chief of the electrical bureau; Dr. Hollis Godfrey, chief of the bureau of gas, and George E. Mapes, chief of the bureau of lighting. The board will act largely as does the board of highway supervisors and will consolidate all charts, maps and other records into a single correlated group. The maps and records for gas, electric and gasoline lamps are kept in separate places, which makes it impossible to regulate the placing of the different classes of lights so as to give the best results. At present the electric lighting is under the control of the department of public safety, while that of the gas and gasoline lamps is under the director of public works. The new board proposes to make a systematic study of the street lighting of the city, taken as a whole, with a view to co-ordinating properly the use of the three illuminants and to standardize the lighting according to the character and importance of the streets, as well as the location of the lamps, so as to get the best results. The new board will also have charge of the preparation of specifications and execution of contracts for the different kinds of lighting. The board of lighting supervisors has assigned N. H. Holz, now chief line inspector of the electrical bureau, as the executive officer of the new board to handle the details connected with the location and relocation of lights and to put into general operation the plans of the board.

Director Cooke, in discussing the new lighting board, said:

"The administration feels that the time has come for the consolidation and further improvement of the city's lighting interests. A great improvement has already been accomplished in this field, but the placing of the entire system under a board working in harmony and with a definite plan of action must necessarily accomplish better results than when conducted as separate bureaus.

"The present division of authority over street lighting between three bureaus under two directors is necessarily lacking in efficiency, and is frequently a source of annoyance to the citizen who wishes to make complaints or to suggest improvements. Owing to the divided authority there is often an unsatisfactory mingling of the different kinds of lights on the same street, and lights are not always placed to the best advantage.

"Although the present administration has reduced the cost of arc lighting $100,000 per year and has increased the efficiency of the gas and gasoline lamps, still better results can be obtained by the centralization of authority.

"This year the illuminating value of 24,000 gas lamps has been double by the substitution of mantle burners for the flat-flame burners. The creation of a street testing organization for lights has also resulted in a vastly improved service from 18,000 gasoline lamps within the city and has also reduced the bills for that character of light to the city $55,000 for the first half of 1913, by reason of fines imposed and the transfer of gas, gasoline and electric lights from private property and the systematic relocation of those lights so as to bring about the most effective results.

"Notwithstanding the progress that has been made in the last eighteen months, it is felt that the city is only really at the beginning of the possibilities in the matter of street lighting, and that the creation of the new lighting board will make possible still greater development along that line."

The plans for the creation of the new board were prepared by Chief Pike, of the electrical bureau.

Philadelphia Seeks Gas Expert.

Philadelphia, Pa.—Peter Bolger, secretary of the Civil Service Commission of this city, has requested Mayor Whitlock of Toledo, O., to send the names of persons who the Mayor believes would be qualified to act as chief inspector of the municipal bureau of gas. The city is to hold an examination for the $5,000 position on August 15, which will be thrown open to candidates throughout the country. The city is anxious to procure a man of sufficient administrative ability to direct the technical and operating forces in such a manner as to make the service to the public compare favorably with that anywhere else in the country, and it realizes that it should go beyond its own limits to obtain such a man.

Standard Lighting Rules for Indiana Cities.

Indianapolis, Ind.—After a conference here with the officers of the gas and electric companies and other experts, the Public Service Commission has announced a list of rules relating to standards for all lighting companies operating under the commission. The rules may be changed at any time, either as to state standards or as to individual cases. The most important rules affecting gas companies call for meters with an error less than 2 per cent. when gas is passing at the rate of six cubic feet an hour a light. Meters must be checked with a standard gas prover and recorded after three years and, if desired by consumers, once each six months either by the company or by a Public Service Commission inspector. A heat value of gas within one mile of various plants of 600 B. T. U. (allowing a drop to 550 B. T. U. in certain cases) is required, gas being tested by a standard calorimeter outfit. The pressure, as measured at meter inlets, must never be less than 1½ inches nor more than 6 inches of water pressure, and the daily variation must never exceed 100 per cent. of the minimum pressure. Gas must not contain more than 30 grains of total sulphur for 100 cubic feet, and not more than a trace of sulphuretted hydrogen. In the case of electric companies, no meter which registers on "no load" may be used, or any meter which has an error of registration greater than 4 per cent. on light, half or full load. Meters must be tested and recorded with standard apparatus at time of installation, each year and at request of consumers, each six months. On constant potential systems, a standard average value of voltage must not vary during one day by more than 6 per cent. of minimum. The companies must advise consumers of most efficient service and must keep records of all complaints or interruptions.

Stop Use of Electricity to End Strike.

Muskegon, Mich.—Planning to bring about the cessation of the use of electricity in every possible form, particularly in street and store lighting, a mass meeting at the city hall, with hundreds of well known citizens in attendance, made what is considered by the striking linemen of the Grand Rapids-Muskegon Power Company the first real step toward the settlement of the present difficulty. No boycott is planned, but a committee of five, named by a vote of citizens present, is to unofficially advise the elimination of the use of current wherever possible. The committee is also to meet similar bodies to be named in other towns affected by the strike and endeavor to show in some way the public's disapproval of the stand of the power company against raising the wages of the striking linemen. Strikers say that cutting off the power in many of Muskegon's larger stores, in hundreds of residences and on the streets will mean a loss to the company of many thousands of dollars each week, while the settlement of the strike, even were the terms of the strikers acceded to in every particular, would only bring an added expense to the corporation of $15 a day.

Company Objects to Heavy Lighting Fines.

Philadelphia, Pa.—The legality of the big lighting fines imposed on the Welsbach Street Lighting Company of America by Director Cooke, for deficient candle power in the gasoline lamps, will be threshed out in the United States District Court, the company having begun suit to recover the full amount due under the contract for 1913, or $274,976.08. Although the fines amount to only about $56,000, the whole amount due on the monthly installments is sued for, as the company has refused to accept the warrants with the heavy fines deducted. The company insists that the method adopted by the city for determining the candle power of the lights was improper, not being the one prescribed in the specifications. Sixty candle power is required under the contract, and the tests by the street photometer system and by laboratory methods, on which Director Cooke based the fines, were made by the Electrical Testing Laboratories of New York and other outside experts. A report showed that in two of the five districts the candle power exceeded that named in the contract but that the average was only 52.8. Director Cooke wishes to use this suit to determine finally the legality of the fining system.

New Current Contract for Schenectady.

Schenectady, N. Y.—In the contract now being drawn up between the city and the Schenectady Illuminating Company, the latter agrees to furnish power at the old rate, $6.50 per million gallons, while the General Electric Company is willing to waive its claim for eight years' interest on the purchase price of the low pressure pumps at the Rotterdam water station, which it sold to the city for $25,200, which has not been paid. New pumps, at a price slightly more than was to have been paid for the old ones, will be placed at Rotterdam by the company, thus taking the old ones off the city's hands.

City Electrician for Economy.

Perth Amboy, N. J.—The inspection of electrical work will be removed from the underwriters and placed in the hands of a city electrician. This plan of Alderman John J. Clark has the approval of Mayor Ferd Garretson and City Attorney C. C. Hommann and is expected to result in more efficient service for contractors and property owners and the diverting of some $2,000 annual fees from the underwriters into the city treasury.

Light and Power Plant Improved.

Tarboro, N. C.—The City Council has authorized Light and Power Commissioner C. P. McCluer, and Superintendent E. P. Meredith to spend $5,500 in remodeling the present city light and power plant, and purchases up to that amount have been made and the work of putting in the machinery has been started. The present plant supplies the city with a single phase current for lighting and power purposes and the proposed changes will give the city a much better service both for light and motor uses. After the new machinery is installed all the motor current over five horse-power will be three phase, the rest to be run on the present system, which will be supplied by the new equipment. This equipment will enable the company to supply light and power for the present and future needs of the city and will take care of all present industries that use power and several that have signified their intention of installing it. These changes were greatly needed here, as the plant in its present condition does not answer the purpose at all. There is not enough machinery to take care of the load, and in case any more was added some sections of the city would have to be cut off to start the other circuits.

Company Reduces Lighting Rates 20 Per Cent.

Providence, R. I.—Under the terms of the agreement reached between the joint special committee on lighting franchise and the Narragansett Electric Lighting Company, the provisions of which have been made public, the company will make a reduction of about 20 per cent. on all lighting rates, dating from July 1, 1913, provided the agreement is ratified by the City Council. Provision for the reduction is one of the important points in the three agreements drafted by the franchise committee as a solution of the tangle which arose several months ago when the Rhode Island Power Transmission Company applied for franchise rights in this city. The agreement further states that in return for this reduction the company's franchise tax is reduced from 3 per cent. on gross earnings to a half of 1 per cent. on the same.

New Machinery Improves Municipal Service.

Topeka, Kan.—A new dynamo for street lighting, operated by a municipal plant, has been received, and is being installed. The actual installation will be made on the first moonlight schedule, the plant being shut down when the city can best dispense with street lights for the ten days required to install the new machinery. The new dynamo was made necessary through the extension of the city's special lighting system, which has been pushed steadily for the last two years. The city water works is to be increased in its efficiency through the installation of a new $50,000 pump, which has been received during the last week. The big new pump has almost as great a capacity as two old pumps now in use, and practically will double the pumping facilities. The old pumps are to be taken down and remodeled as rapidly as possible after the new pump has been installed and tested.

City Fights For Low Gas.

Minneapolis, Minn.—Seventy-cent gas has been unanimously voted for by the special committee of the City Council on the Hooker ordinance. The action is taken to mean, in view of intimations of the Minneapolis Gas Light Company, that there will be a battle in the courts over the validity of the ordinance which will probably last from one to three years. The committee acted in accordance with the report of the council's expert, Prof. William D. Marks, and recommendation of Attorney Daniel Fish.

Company Pays City for Gas.

Philadelphia, Pa.—In a statement made to City Controller Walton, in accordance with the terms of its lease of the city gas works, the United Gas Improvement Company reported that during the quarter ending June 30 it manufactured 2,222,419,800 cubic feet of gas. In payment for this and of delinquent accounts since the lease went into effect in November, 1897, the company collected during the quarter included in the report $2,346,085.65, of which the city's share amounted to $464,504.63.

Reducing Electricity Rates.

Freeport, L. I.—The consumers of electricity in this village—about 85 per cent. of the population—will have their bills reduced about 18 to 20 per cent. after August 1. Hitherto the rates have been as high as 12 cents per kilowatt—sometimes higher. Although continually promised, no reduction had been accomplished. The income of the village through its electric plant, has been increased, and $20,000 has been sunk in the electric light fund. After consultation, Smith Cox, president, and Ernest S. Randall, chairman of committee on electricity, have decided to reduce rates by 2 cents per kilowatt.

FIRE AND POLICE

Gamewell System Adopted in Augusta.

Augusta, Ga.—Although the highest bidder, the Gamewell Fire Alarm Telegraph Company was successful in having its police alarm system adopted. The system is equipped with a flashlight, and a bell or horn, with which the patrolman walking his beat can be summoned to a box at any time during the day or night. The boxes have a telephone in each of them, with which the patrolmen can communicate with the main office at any time. At the office there is a well-arranged table with what is known as a unit system, by which the desk sergeant is enabled to communicate with any of his patrolmen at his will. If a prisoner has escaped, for instance, all that has to be done at the office is to pull down one of the levers of the apparatus, and the flashlight begins to work, summoning the officers on their beats to communicate with the desk sergeant and he can then communicate with all the patrolmen at once.

Fire Engine Test.

Bridgeport, Conn.—In a test made with a fire hydrant connected with a six-inch main a big Waterous fire engine pumped 730 gallons a minute.

Want Lighter Police Uniforms.

St. Louis, Mo.—Declaring it inhuman to compel police officers to wear a heavy uniform and caps which afford no protection from the sun, the City Council of East St. Louis has adopted the resolution of Alderman Tony Hahn requesting the board of fire and police commissioners to provide for the use of cooler uniforms and straw hats. The new uniform will weigh from 8 to 10 pounds.

Metal Shields As Protection for Police.

London, England.—A large metal shield some three feet long by two feet broad, carried over the shoulders like a housewife's apron, may be worn by the London policemen in future when dealing with armed burglars and lunatics. For some months official Scotland Yard has been engaged in testing and experimenting with various types of bullet-proof shields which will protect the head and body of the constable and at the same time allow him to use his revolver effectively and with perfect safety. A

white paper on shooting outrages on the police, just issued, gives some interesting figures showing the number of cases in which firearms have been used against police officers from 1908 to 1912. The total number of police officers shot at between 1908 and 1912 was 92, of whom 6 were killed and 24 injured, while 62 escaped injury.

Houlton's Modern Fire Department.

Houlton, Me.—The Houlton Fire Company, under Charles H. McCluskey, chief engineer, was awarded second prize in the recent parade. The city is very proud of its efficiency and the modernity of its apparatus. The fire house, built in 1907, is equipped with an up-to-date system for making a quick hitch-up, a workroom, a furnace and a

Courtesy Bangor Commercial.
FIRE DEPARTMENT OF HOULTON.

cement tank for hose-washing. The town has an electrical alarm system of 16 boxes. On Pearce's Hill there is a tank with a capacity of 2,500,000 gallons, which gives a pressure of about 90 pounds, and which is filled by two electrically-driven pumps supplying 1,000 gallons a minute. The apparatus consists of a steamer, two two-horse hose wagons, one ladder truck and a hand-tub for the C. P. R. station part of the town.

Progressive Fire Department Reduces Insurance Rates.

Waycross, Ga.—Practically every condition imposed by the Southeastern Underwriters' Association for a reduction of insurance rates has been met by the enterprising fire department. Horse-drawn apparatus has been replaced by automobile apparatus, the most recent addition being a $9,000 auto pumper. A modern electric fire alarm system has been installed at a cost of $10,000, new hose purchased, a hook and ladder truck added to the department, and to insure sufficient water in case of a prolonged fire a third artesian well has been bored by the city water works department. Water mains are being extended in all sections of the city. To further increase the fire-fighting efficiency of the city a large number of streets are being steadily improved by paving and concrete bridges. It is expected that the association will announce the reduced rates by the beginning of September.

MOTOR VEHICLES

New Trucks for New York Police.

New York City, N. Y.—The R. & L. Company, of New York, eastern distributors for the Garford Company, of Elyria, O., has delivered to the Police Department 10 Garford trucks for use as patrol wagons at the various stations. The order was placed several months ago by the police commissioner, Rhinelander Waldo, when a report of the department disclosed the fact that three Garfords used during 1912 had saved $19,000 or more than three times their original cost in a single year.

New Auto Fire Engine Tested.

Bayonne, N. J.—The test of the new automobile fire engine which has been purchased for the Bayonne department was successfully carried off. Among the visiting officials who witnessed it were Deputy Commissioner of Public Safety Norton and Chief Conway, of Jersey City; Captain Lyon, of the New York fire boat William L. Strong; Fire Chief Francis, of New Brunswick; Bowker, of Passaic; Doane, of Plainfield; Gerstung, of Elizabeth, and Williams, of Montclair. The new engine will be stationed at Fire Headquarters.

Old Hose Wagon Sold.

Newmarket, N. J.—After serving Orange as hose wagon No. 2 for the past nineteen years, the old vehicle was replaced by the combination hose and chemical automobile is beginning a new career in Newmarket. While the wagon with its two chemical tanks had outlived its usefulness in Orange, Fire Chief William H. Matthews, of that city, said the vehicle might be expected to meet the demands of Newmarket for many years. Under the law, the $375 proceeds of the sale is added to the firemen's pension fund.

GOVERNMENT AND FINANCE

To Pension City Employees.

Philadelphia, Pa.—Under the provisions of an act passed by the Legislature and approved by Governor Tener, this city is given authority to establish a municipal pension fund for employees who have been twenty years in the service of the city. While the act provides that the city may set aside for the purpose one-half per cent. of all taxes collected, the provision is not mandatory, and councils must pass an ordinance creating the municipal pension fund before it shall be operative. The act provides that, in the event of the creation of the fund, every employee will be compelled to pay into the fund one per cent. of his yearly salary. The pension to be allowed the beneficiary will be equal to one-half of the average yearly salary received by him during the last two years before his retirement.

Commission Government Tested in Topeka.

Topeka, Kan.—The first test of the commission form of government law in Topeka, Kan., in petitions demanding a referendum of a proposed street car line extension ordinance, is likely to be made in the next week or two. The proposed extensions include two short lines in the city and a long line of about three miles to the principle park of the town, now entirely isolated. Two offers were made by the Topeka Railway company, a branch of the Illinois Traction company. One was to build the park line this year and to be allowed three years to complete the inside extensions, and the other was to build the inside extensions this year and take three years for the completion of the park line. The city commission accepted the last offer. A threat of a referendum on the proposed ordinance, and an initiative on the ordinance reversing the time of building, immediately was made. Both petitions are in course of preparation, and little doubt is entertained but that both will receive the requisite number of signatures to make them operative.

Bond Issue for City Ice Plant.

St. Paul, Minn.—The Municipal Ice Committee has requested the authorization of a bond issue of $150,000 to finance the municipal ice enterprise. Either the bonds will be leased to a contractor who will build ice houses and cut, store and distribute the product or the board will erect its own plant and then lease to the contractor. As yet no bids for the distribution of the ice has been received from the recently organized co-operative ice company.

Large Sums Spent in City Improvements.

Los Angeles, Cal.—Assessments for public improvements made by the city during the fiscal year ended June 30 amounted to $2,736,511.90. The annual report of the Bureau of Assessments shows the following amounts levied against the different kinds of work:

Street work done under the bond provisions of the Vrooman act	$2,025,671.37
Street work done under the cash provisions of the Vrooman act	37,554.75
Street work done under the Hammon act	326,294.74
Sewer work done under the cash provisions of the Vrooman act	269,674.25
Lighting assessments	37,316.79

Annexed to Portland, Ore.

Lents, Ore.—This formerly independent municipality, with a credited population of about 10,000, has been annexed to Portland. The annexation proposition was voted upon last fall and passed.

Civic Agencies Plan City Budget.

Philadelphia, Pa.—Representatives of 22 civic and charitable agencies have met in conference to consider plans for co-operating on a thorough study of the city budget. It was found that the annual expenditure of $30,000,000 by forty departments and bureaus of the city government presented enormous opportunities for accomplishing, through these municipal bureaus, much of the social and civic work for which private funds are now being expended. The facts collected by the various organizations will be brought together, analyzed and presented by the agencies to the Mayor, department heads and the Finance Committee of the Councils. This is the first concerted effort made by volunteer organizations to use the vast amount of information which they have concerning specific conditions and needs to assist public officials in understanding and meeting conditions more efficiently. A committee has been appointed to take up actively the preparation of data. It consists of Dr. Jesse D. Burks, director of the Bureau of Municipal Research, chairman; Hubert .W Wells, secretary of the City Club; R. M. Little, general secretary of the Society for Organizing Charity; James S. Hiatt, secretary of the Public Education Association, and Bernard J. Newman, secretary of the Housing Commission.

Registration of City Bonds.

Dayton, O.—For the first time here bonds were registered in the sum of $100,000 by Mayor Phillips, City Solicitor Breene and Bernard F. Wendler, secretary of the board of sinking fund trustees. This rule has not been observed in the past, but was followed on this occasion because of the fact that some of the recent emergency bonds, which were sold in the sum of $800,000, were widely distributed, some of them being sold in Russia, and this procedure was adopted as a matter of security. It is probable that this precedent will not be followed in the future unless it is demanded by the purchasers, although it will be optional with the officials. The fact that it requires that bonds cannot be sold in part, after the registration, has been made the source of objection in the minds of the officials of some cities where the rule has not been followed.

STREET CLEANING AND REFUSE DISPOSAL

World's Largest Disposal System at Atlanta.

Atlanta, Ga.—With the completion of the new disposal plants at Intrenchment creek and Peachtree creek, this city will have the largest sewage purification system of its kind in the world. That is, it will have the largest system using Imhoff tanks and the filter beds, pronounced by experts the most satisfactory system. At Proctor creek, the first plant completed, there are 12 Imhoff tanks with a capacity of 3,000,000 gallons a day. The cost of the plant was $108,000. The Peachtree plant, which will cost about $196,000 will have 30 tanks, with a capacity of 8,000,000 gallons and a pipe capacity of 90,000,000 gallons. The entrenchment plant, which will cost about $171,000 will have twenty tanks, with a capacity of 5,000,000 gallons per day, and a pipe capacity of 40,000,000 gallons. The Atlanta system, therefore, will have 63 Imhoff tanks, 6 acres of filtering beds and a capacity of 16,000,000 gallons per day.

Confident of Municipal Garbage Disposal Plant.

San Jose, Cal.—City Engineer Irving L. Ryder, in recommending the construction of a municipal garbage incinerator says that one may be built for $30,000 and leave a balance of $20,000 for devising a system by which all the people of the city could send their garbage to be treated at a charge which would simply pay the costs of collection. Some of the features of the plant proposed are: The capacity for unloading two teams simultaneously, multiple units to allow of repair, capacity of a single unit to be 15 tons in 12 hours, no rehandling, proper handling of dead animals, no offensive smoke, a 150-foot chimney, and fireproof building. Only two men would be required to operate a plant like this, and the greatest efficiency and lowest cost per ton can be reached if enough garbage is received to run the plant at full capacity.

Garbage Plant Plan Abandoned.

Reading, Pa.—With the installation of the new city council, the plans of the garbage committee, Dr. Frank Gable, chairman, Henry L. Darrah, John Watson, E. H. Kortenhorn and William S. Hoffman, regarding the erection of an incinerating plant will be given up. Among the data secured by the committee was the statement of Trenton, N. J., where garbage is collected and disposed of in an incinerating plant at the rate of $1.18 a ton. In 1912, with a contract with Harry Adams, at the rate of $1.94 a ton, Reading's bill amounted to $16,511.34.

Citizens Protest Against Garbage Plant.

Brooklyn, N. Y.—Residents of Flatbush, Canarsie, East New York and the Rockaways are very indignant at the plant, which has already been approved by Street Commissioner Edwards, to locate a new garbage disposal plant on Ruffle Bar, one of the reclaimed marshes in Jamaica Bay. The prospect of erecting a garbage disposal plant, with its disagreeable odors, which are now bad enough from the Sanitary Utilization Company's plant at Barren Island, is viewed with alarm by the residents of these communities, and the men who have spent millions in developing them as residence sections.

RAPID TRANSIT

City Regulates Employment of Car Men.

Schenectady, N. Y.—To prevent accidents on street railway cars because of inexperience, Alderman Charlest introduced an ordinance which provides that no person shall be permitted to act as conductor or motorman unless he has received 15 days' instruction. Violation of this ordinance will constitute a misdemeanor, punishable by $150 fine, or 60 days' imprisonment, or both.

Electric Cars for Tyler.

Tyler, Tex.—Work has commenced on the construction of an electric street railway system. The contract with the city and the Tyler Commercial Clubs calls for its completion in six months. However, the street car company has agreed to have the line to the East Texas Fair Grounds completed and in operation by Oct. 1. The street car line will be a fraction under seven miles and will tap the thick residence districts, also a number of additions to the city. The franchise was taken out by Daniel Hewitt, of Cleburne, who has built several street car lines in Texas and one or two in Kansas. The Tyler Commercial Club raised $30,000 as a bonus to secure a car line.

MISCELLANEOUS

Wants Municipal University.

Akron, O.—After an investigation, by a special committee of six citizens, headed by Councilman James Shaw, a report has been filed recommending the acceptance of Buchtel College as the nucleus for a municipal university. The committee, in answering questions set, report that under state laws a levy of 0.55 mills may be incorporated for a municipal university. The advantages of such an institution, judging from the experience of the University of Cincinnati, would be innumerable. The committee finds that there the professors and students do all chemical and microscopical work for the city hospital laboratory, all analyzing and testing for the engineering and purchasing departments, and serve as experts in connection with water, street car and telephone problems. The teachers' college trains new teachers and gives expert advice to the board of education; the department of psychology tests defective pupils and has established a special educational hospital for them, while the department of political science maintains a municipal reference library in the city hall to collect information and supply information on municipal problems.

City Planning Boards Instituted.

Baltimore, Md.—William W. Emmart and William H. Maltbie and others of the City-wide Congress propose a permanent City Planning Commission headed by an expert to co-operate with the city administration. Every commercial, business and improvement organization in the city will be asked to meet and nominate a small committee. These numerous small committees will assemble in conference with the similar committee of the City-Wide Congress and the personnel of the permanent commission will be decided upon. Included in the comprehensive plan for civic development is the solution of the very important terminal problems of the Pennsylvania, the Baltimore and Ohio and the Western Maryland railroads. Plans will be developed aiding the improvement of the railroad service, civic comfort and beauty and commercial interests.

Harrisburg, Pa.—The Mitchell Bill, providing for a city planning department in York, Lancaster, Reading and other cities of the third class has been approved by the Governor. It creates an additional executive department known as the department of city planning, to be in charge of a city planning commission composed of five persons to be selected by the mayor and council for five-year terms. They are to have authority to supervise the location and widening of streets, parks, parkways, play grounds, public buildings, civic centers and other public improvements for three miles outside of city limits. They are to have power of disapproval, which, however, will not act as a veto.

By-Laws for City Planners.

St. Paul, Minn.—By-laws have been drawn up for a city-planning conference by Adolph Meyer, Gregory Bolt, Dr. A. W. Dunning, T. J. Holyoke and Mrs. L. A. Hamlin. Six organizations have been invited to become charter members: The Civil Engineers' Society of St. Paul, Gargoyle Club, Women's Civic League, Men's Garden Club, Real Estate Exchange, and Woman's Welfare League. All but the last have already accepted, and a meeting will be called to form committees: Membership, ways and means, and lectures and exhibits. There will be five committees on city planning as follows: Street planning; traction lines, railroads and docks; public buildings, open spaces and waterways; housing; legal administrative methods; municipal real estate policies; taxation. It is planned to have city officials become members of the working committees whose activities are related to their own. The conference will hold semi-annual meetings, one in connection with an annual city planning exhibit. During the past years a great many city plans have been gotten up by Mr. Nolan and Mr. Cass Gilbert of New York but no action has been taken. The conference has grown out of a movement started by the Women's Civic League and indorsed by the civic committee of the Fourth District of the Federation of Women's Clubs. All clubs of the Federation will be invited to join, and each member will affiliate with some working committee.

Freeholders to Study Bascule Bridges.

Newark, N. J.—A committee of freeholders of Essex, Hudson and Bergen counties, composed of Richard F. Mattia, Chairman of the bridge committee; Seymour P. Gilbert, chairman of the road committitee; Ernest E. Ryman, Amos W. Harrison, County Engineer Frederic A. Reimer and Jacob Seidler, clerk, is making a tour of inspection of bascule bridges in service in Chicago, Detroit and Boston. It is proposed to build a new bridge over the Passaic River at Belleville and Engineer Reimer suggested the bascule type. In Boston the representatives of the board are also inspecting Tarvia pavements which have been suggested for the roads of this county.

New Municipal Market.

Denver, Colo.—In response to a petition from taxpayers of Capitol Hill, Mayor Perkins opened the third municipal market at West Thirty-second avenue and Truing Street. Record sales are being made at the two neighborhood markets at East Cedar avenue and Pearl street where there are sixteen wagons and at Curtis stret branch near Thirtieth where there are eighteen. The new market is the subject of much enthusiastic approval.

Studies to Beautify City.

Empora, Kan.—To make a garden spot of every vacant lot in Emporia is the task just begun by Charles Phipps, head of the department of agriculture of the Kansan Normal School. The unsightly vacant lot grown up with weeds in the summer and bristling with tin cans in the winter is to take on an appearance of comeliness. The work will be done by students and will serve two ends from the students' point of view: he will gain knowledge in the culture of plants, which will be a part of his regular school work, and he will earn a part of his way through school. All the vacant lots that are good for gardening will be used. The lots will be planted in low-growing vegetables, potatoes, lettuce and probably rhubarb. The students will do the planting and tending of the lots under the direction of Mr. Phipps. It is expected that most of the lot owners will be glad to have their lots cared for, but in case rent is demanded the students will arrange to pay it when they harvest their crops.

Woman Inspector for Philadelphia Streets.

Philadelphia, Pa.—For the first time in the history, this city is to have a woman street inspector. Director Cooke of the department of Public Works has announced the appointment of Mrs. Edith W. Pierce, secretary of the Home and School league, to the position, at a salary of $1,300 a year. Mrs. Pierce's duty will be somewhat different from that of the men inspectors. Instead of having a district, she will cover the whole city and will pay particular attention to the condition of schools and homes. She is to organize sectional associations for keeping the streets, sidewalks, homes and schools clean, and will visit them frequently making addresses and instructing them in the ways of municipal cleanliness.

Campaign for Street Safety.

Washington, D. C.—An effort is being made by the Street Safety Association, the Rhode Island Avenue Suburban Citizens' Association and the Washington Star, to raise $500 for a one-year campaign for street safety. It is proposed, among other means for the advancement of this object, to give prizes for methods and to distribute literature on the subject to the school children.

Park and Playground for Indianapolis.

Indianapolis, Ind.—The Board of Park Commissioners announce the plans in which a gift of a new 33-acre park and playground will be made to the people of West Indianapolis. The cost will be less than $1,500 an acre, but since many of the property owners on this side of the city suffered during the recent floods, the board decided to exempt them from the park assessment, and to meet the entire cost of the land acquisition from board funds.

Lower Arc Globes Exterminate Brown Tail Moth.

Laconia, N. H.—Joseph H. Killouhy, who has charge of the destroying of the brown tail moth in the city has arranged to have the globes at the arc lights lowered each evening during the flight of the white millers, as this method is found to be an excellent one in exterminating the pests. Mr. Killouhy announces that there will be no fires built, as in seasons past as the globe way does the work, and owing to the dry condition that prevails, the fires might lead to a serious conflagration. This city is comparatively free from the brown tail moth.

A City Paper.

Sacramento, Cal.—The City Clerk, acting under direction of the City Commission, is preparing for the publication of a weekly Municipal Gazette, as required by the charter. The Gazette will contain accounts of the commission's actions and also advertising, now done in a daily newspaper.

A City Beach.

Mishawaka, Ind.—Urged on by the drowning accidents which occur in the St. Joseph River, Park Commissioner John A. Rishel and the board, after authority received from the aldermen, have commenced work on making the beach more safe. The board also plans the erection of a bathhouse to be in charge of a trained swimmer and life-saver.

Municipal Farm to Combat High Cost of Living.

Columbus, O.—Acting on the suggestion of the Department of Public Service, the city has set forty city-jail prisoners at work on the municipal farm. Buildings and fences will be erected and the 87 acres of farm cultivated. The farm includes a municipal pasture for the city's horses and land planted with corn, potatoes, beans, alfalfa, clover and tomatoes. A large herd of hogs will be raised, the city garbage being used for fattening. Besides reducing the cost of supplying food to the city institutions the officials expect a decided benefit to the prisoners selected to serve as "farm-hands."

Public Market Project Urged.

Fond du Lac, Wis.—With the erection of a terminal building on the site of the present Lewis House property on North Main street, it is believed that a public market will be established on the rear of the property on Portland street. The market will in all probability be similar to those which are now operated by municipalities in all parts of the country and which are being used as a method of reducing the high cost of living.

Municipal Saloons at Work.

Sisseton, N. D.—The license for two saloons has been granted by popular vote. The licensee is managing the business at a salary of $1,800 per year and the profits will be divided—fifty per cent. going to the county good road fund and the other half to the city treasury. The daily receipts will be turned over to two leading citizens under whose control the business will be conducted, the name of the city not appearing in any of the transactions of the saloon.

A Municipal Laundry.

Seattle, Wash.—President Robert E. Hesketh of the City Council has introduced a resolution advocating a municipal laundry. It is proposed to give employment to women prisoners in the city jail who are on terms of longer than three days.

Municipal Lodging Houses.

Chicago, Ill.—Municipal lodging houses for women will be an issue in the next city campaign in Chicago when women march to the polls for the first time. Mrs. L. Brackett Bishop, suffrage leader and social worker, made the announcement.

Contractors' Deposits Increased.

Erie, Pa.—A special committee of councils, consisting of Select Councilman Gross and Common Councilmen Scheer and Gunnison, met last week and after a lengthy discussion recommended that hereafter all contractors bidding on city work shall be made to deposit either cash or certified check for ten per cent. of the amount of the engineer's estimate of the work they bid on. This committee was appointed upon recommendation of Mayor Stern made in his veto of Councilman Scheer's original resolution providing for a ten per cent. deposit. Mr. Scheer said that 25 per cent. was the usual rate in other cities and he thought that ten per cent. was as low a figure as should be made.

City's Intoxicated Recorded.

Harrisburg, Pa.—Clarence Backenstoe, Clerk to the Mayor, has completed a system for keeping a record of habitual drunkards and the number of times of arrest. The card-files will be used by the mayor in punishing the offenders.

A New Traffic Law.

Raleigh, N. C.—The commissioner has passed an ordinance imposing a fine of $10 on any automobile driver who fails to stop and sound his horn before he passes a stationary street car if he is approaching parallel with the car track and within 10 feet of it.

City Tallies Road Traffic.

Tottenville, N. J.—Men of the highway bureau are stationed at twenty-six different places throughout the island taking censuses of the traffic passing at the road intersections. They will be at each place a different day each week for seven weeks.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Gas and Electric Franchise.

Gathright et al. v. H. M. Byllesby & Co. et al.—It is not the province of the court to usurp the functions of the general council of a city by questioning the wisdom of their authorized acts, and an ordinance may not be held invalid upon any other ground than its illegality. The fact that an ordinance was passed on the same day that it was introduced does not necessarily show that a free discussion has not been had, so as to authorize the court to interfere under Kentucky statute, providing that no ordinance shall be passed until it shall have been read in full and free discussion allowed thereon. Under Kentucky statute, providing that no ordinance shall be altered or amended in any way, except by repealing it, an ordinance making an agreement with a proposed purchaser of a gas franchise, offered for sale by another ordinance, that it might, in consideration of becoming a bidder for the gas franchise, acquire an existing electric company, which was forbidden to consolidate with a competing company of which the proposed purchaser had control, and that the city would waive the prohibition, is not invalid, since the statute was not intended to affect private rights of parties obtained under ordinance. Kentucky statute, providing that a city must, on the expiration of a franchise, offer for sale a franchise similar to the old one, is for the benefit of the owner of the existing franchise; and hence, when such owner does not complain, there can be no objection that, on the expiration of a franchise for the sale of natural gas for fuel and heating purposes, a franchise was offered for the sale of natural gas, manufactured gas, and mixed gas. Though, under Kentucky statute, on the expiration of a franchise, a city must offer for sale a franchise similar to the former one, yet this does not prevent the city from offering for sale a dissimilar franchise, when it specifically provides that the franchise is not exclusive, since it could, by another offer of sale of a franchise, comply with the terms of the statute. The right of a city to purchase a gas franchise at the expiration of its term being a contract right, an ordinance agreeing with a proposed purchaser of a gas franchise, offered for sale by another ordinance, that the city would defer its option to purchase a franchise controlled by the proposed bidder, and which would expire in six years, until the expiration of the franchise proposed to be sold, is not invalid. An ordinance agreeing with a proposed purchaser of a gas franchise, offered for sale by another ordinance, that in consideration of offering such franchise for sale the purchaser, if the successful bidder, might buy an existing electric company, and that it would be bound by the rates for electricity the city had set forth in the agreement, is not illegal, because the city thereby undertook to commit the general council in advance to enact certain ordinances, and restricted its powers of reducing such rates, where the contract ordinance reserves the right to make reasonable regulation of rates for use of electricity. The public policy of a state is to be found expressed in its Constitution and statutes and in its common law as found in the opinions of its court of last resort. Since it was held in 1906 that under the law of Kentucky there is no prohibition against the formation of trusts or monopolies, but that they are liable to fine if they sell their products above or below their real value, and the legislature has seen fit not to change the law, it is the public policy of the state; and hence an ordinance agreeing with a proposed purchaser, who controlled all the gas and electric companies in the state except one, that in consideration of being a bidder for a gas franchise, authorizing the furnishing of natural gas, manufactured gas, and mixed gas, offered for sale by another ordinance, it might purchase the remaining electric light company and furnish both gas and electricity to the city and private consumers, under rates fixed by the ordinance, is not invalid as creating a monopoly. An ordinance offer-

ing a gas franchise for sale is not invalid, within Constitution, providing that no franchise shall be granted unless after due advertisement, because it gives only two weeks' notice, one notice in an English paper and another in a German paper, where there is no statutory definition of what constitutes due advertisement, as the good faith of the general council will not be questioned. An ordinance, constituting an agreement with a proposed purchaser of a gas franchise, offered for sale by another ordinance, requiring that the purchaser, if the successful bidder, should pipe natural gas to Louisville from West Virginia, cannot be held, in a suit to enjoin the carrying out of the ordinance, invalid within Constitution, prohibiting the grant of a franchise unless to the highest and best bidder, because the proposed purchaser owns all the available natural gas fields in West Virginia, when the pleading merely alleges that in West Virginia there are very extensive areas under which there lies natural gas, and that the purchaser has, so plaintiff is informed, by contracts through itself and its agent, an option to purchase or lease certain tracts in West Virginia, under which tracts such available natural gas exists. An ordinance constituting an agreement with a proposed purchaser of a gas franchise, offered for sale by another ordinance, requiring that, in consideration of offering such franchise for sale, the purchaser, who had the control of practically all the gas and electricity in the city, would pipe natural gas to Louisville from West Virginia, which could only be done at a great cost, is not invalid, under Constitution, prohibiting the grant of a franchise unless to the highest and best bidder, because the purchaser, by reason of his ownership and capital, was on a better footing than other bidders would be. A gas and electric franchise to be sold, so drawn as to cover only territory already occupied by the pipes or wires of an existing company, is not for that reason invalid, as giving an undue advantage to the owner of the existing plant. A city, by an agreement incorporated in an ordinance, providing that a proposed purchaser of a gas franchise, offered for sale by another ordinance, if the successful bidder, might purchase an existing electric company, may waive a stipulation in the franchise of such latter company prohibiting consolidation. An ordinance made an agreement with a proposed purchaser of a gas franchise, offered for sale by another ordinance, that if the purchaser were the successful bidder it might purchase an existing electric company, and that the city would waive a stipulation in the franchise of the latter company prohibiting it to consolidate with a competing company of which the purchaser had control. Held, that the waiver was not invalid, as giving the proposed purchaser, as a bidder, a privilege over other bidders, in violation of Constitution, and since other bidders cannot be prohibited from buying the electric company and might also buy the new franchise; hence the waiver merely put the purchaser on an equal footing with other bidders.—Court of Appeals of Kentucky, 157 S. W. R., 45.

Lighting Districts—Special Assessments.

Parker v. Wallace.—That the act of the city council in creating an inside lighting district results in hardships to certain property owners, or that there is some other and better way of carrying out the council's purpose, or that a large number of taxpayers are opposed to the creation of such district, will not, in the absence of fraud or other similar intent, invalidate a special assessment levied against a property owner for his proportion of the cost of the new lighting system. Under charter of the city of Auburn, which empowers the council to create a lighting district, "the cost of which shall be fixed and collected * * * as may be designated by the common council," the city is given ample authority to assess the cost against the property deemed by the council to be benefited thereby. Power to levy an assessment for a local improvement exists only when clearly and distinctly conferred by statute. Charter of the city of Auburn, authorizing the council to create and alter lighting districts and install additional lights, is not violative of Constitution, relative to the organization of cities and limitation of their taxing power. A statute should, if possible under a fair view of the language used, be given such construction as will render it constitutional. Charter of the city of Auburn, authorizing the creation and alteration of lighting districts and the installation of additional lighting, is not invalid and does not authorize the taking of property without due process of law because it fails to detail the methods for the assessment and collection of a special assessment to meet the cost; both the city charter and Laws 1905, c. 352, providing in sufficient detail relative to special assessments, and this section being merely an extension of powers already vested in the common council.—New York Supreme Court, 142 N. Y. S., 523.

Licensing of Stationary Engineers.

People v. Fournier.—The charter of a city, which empowers the council to make and enforce ordinances not inconsistent with the Constitution or laws of the state as they shall deem the public safety and welfare of the city require, authorizes the council to adopt an ordinance for the examination and licensing of stationary engineers by a board of examiners. An ordinance creating a board of examiners for the examination and licensing of stationary engineers and requiring the board, on finding that an applicant is qualified, to give him a certificate, on presentation of which to the city treasurer with the payment of a fee a license shall be issued, is valid, and is not objectionable as delegating to the board legislative power to determine the qualifications to be possessed by engineers.—Supreme Court of Michigan, 141 N. W. R., 089.

Street Improvement Assessment—Items.

Arnold et al. v. City of Tulsa et al.—Where article 9 of the charter of the city of Tulsa provides that upon the passage of a resolution for street improvement it shall be the duty of the city engineer to prepare specifications for such improvements embracing the different matters or different plans or methods under which said improvements are to be constructed, which was done, and where it appears that said engineer was not a salaried officer of the city, held, that an item of $335.14 for the engineer's charge, is a proper item to be assessed upon the abutting property as a part of the cost of such improvement.—Supreme Court of Oklahoma, 132 P. R., 669.

River Banks—Public Use.

Warriner et al v. Board of Commissioners of Port of New Orleans et al.—In the city of New Orleans the levee constitutes the banks of the Mississippi river, and all the batture in front of said levee is dedicated to public use in the interest of commerce and navigation in their broadest sense.—Supreme Court of Louisiana, 62 S. R., 157.

Existence of Street—Pleading.

Keystone Commercial Co. v. City of Maysville.—In an action by a municipality to enjoin the continuance of a fence across a street, a petition, alleging that the city had used and had exclusive jurisdiction of the street for more than 50 years, during which time it had used the street as a thoroughfare for the use of the city and the public generally, is a sufficient averment as against a demurrer that the city was in the actual, peaceable, uninterrupted and exclusive adverse possession of the street for more than 15 years; the ownership of the city of course being for the use of the public.—Court of Appeals of Kentucky, 157 S. W. R., 25.

Accident—Sewers—Liability.

City of Louisville v. Frank's Guardian.—The sewerage commission of Louisville, a corporation created by Kentucky statute, with power to construct a system of sewers, and charged with the duty of restoring the streets to their original condition, and then to turn over the completed portion to the board of public works, gives the commission absolute control over the streets while constructing a sewer therein, and the city is not liable for injuries to a child falling into a hole dug while constructing a sewer; the commission acting independently of the city authorities, so that the doctrine of respondeat superior cannot apply.—Court of Appeals of Kentucky, 157 S. W. R., 24.

NEWS OF THE SOCIETIES

Calendar of Meetings.

August 7-9.
LEAGUE OF AMERICAN MUNICIPALITIES.—Annual Convention, Winnipeg, Canada. Robert E. Lee, Secretary, Baltimore, Md.
August 19-22.
INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. — Eighteenth Annual Convention, Watertown, N. Y.
August 25-30.
FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE, Buffalo, N. Y. Dr. Thomas A. Storry, Secretary General, College of the City of New York.
August 26-28.
CENTRAL STATES WATER WORKS ASSOCIATION.—Seventeenth Annual Meeting, Cedar Point, O.—R. P. Bricker, Secretary, Shelby, O.
September 1-6.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Forty-first Annual Convention, Grand Central Palace, New York City. James McFall, Secretary, Roanoke, Va.
September 9-13.
AMERICAN PUBLIC HEALTH ASSOCIATION.—Annual Convention, Colorado Springs, Col.—S. M. Gunn, secretary, 755 Boylston street, Boston, Mass.
September 10-12.
NEW ENGLAND WATER WORKS ASSOCIATION.—Annual Convention, Philadelphia, Pa. Willard Kent, Secretary, Narragansett Pier, R. I.
September 22-26.
ILLUMINATING ENGINEERING SOCIETY.—Annual Convention, Hotel Schenley, Pittsburgh, Pa. Jacob Israel, Secretary, 29 West 39th St., New York City.
September 29-October 4.
AMERICAN HIGHWAY ASSOCIATION.—Annual Convention, Detroit, Mich. J. E. Pennybacher, Secretary, Washington, D. C.
October 1-2.
LEAGUE OF PACIFIC NORTHWEST MUNICIPALITIES.—Second Annual Conference, Rose City, Wash. Charles G. Haines, Secretary, Walla, Walla, Wash.
October 7-10.
AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Twentieth Annual Meeting, Wilmington, Del.—A. Prescott Folwell, Secretary, 50 Union Square, New York City.
October 22-24.
PENNSYLVANIA WATER WORKS ASSOCIATION.—Annual Convention, Philadelphia, Pa. M. C. Hawley, chairman Executive Committee, 504 Park Building, Pittsburgh, Pa.
November 10-15.
UNITED STATES GOOD ROADS ASSOCIATION.—Meeting St. Louis, Mo. John H. Bankhead, president; J. A. Rountre, secretary, 1021 Brown-Marx Building, Birmingham, Ala.
November 12-15.
NATIONAL MUNICIPAL LEAGUE.—Annual Convention, Toronto, Canada. Clinton Rogers Woodruff, Secretary, 705 North American Building, Philadelphia, Pa.
December 9-12.
AMERICAN ROAD BUILDERS' ASSOCIATION.—Annual Convention, First Regiment Armory, Philadelphia, Pa. E. L. Powers, Secretary, 150 Nassau street, New York City.

Michigan Association of City Clerks.

City Clerk W. R. Noyes, Albion, Mich., is sending out notifications to the various cities of the state, inviting the attendance of city clerks to the state meeting of the Michigan Association of City Clerks, to be held at Pontiac, Mich., August 14 and 15. This will be the third annual meeting of the state association, of which the local city official is secretary and treasurer. An excellent program has been arranged, and every possible means taken to give the delegates a good time. Every item affecting the work of a city clerk, such as accounting, keeping of records, and other propositions of interest, are taken up and discussed, giving each one the value of the other's experience and ideas on the subject. A large response is expected from many parts of the state at the coming convention by the officials who have the arrangements in charge.

National Paving Brick Manufacturers' Association.

Engineers and contractors from many sections of the country are to gather at Cleveland, O., September 17 and 18 on the occasion of the tenth annual meeting of the National Paving Brick Manufacturers' Association. In former years the association has held its annual meetings during the winter months, but at the last yearly assemblage of the paving brick manufacturers it was decided to hold future conventions during an "open season."

This will afford, instead of the usual program of written papers, discussion and criticism of brick street and brick road construction methods while work on the highways is in actual progress. The large amount of construction work in Cleveland and Cuyahoga county will afford splendid opportunity for investigation in a most practical way.

Chief Engineer Robert Hoffman and Paving Engineer Joseph Bayne of Cleveland, Chief Engineer Frank R. Lander and Road Engineer James M. McCleary of Cuyahoga county, State Highway Commissioner James R. Marker and W. A. Stinchcomb, county engineer-elect, will facilitate arrangements to make the occasion one of real interest.

Automobile tours will be run over the oldest of the thousand miles of city streets and country roads which have given Cleveland and Cuyahoga county a wide name for permanent street and road construction.

At the dinner on the evening of the 17th the occasion will be made enjoyable with informal talks on street and road building. Headquarters will be at the Statler Hotel.

Officers of the National Paving Brick Manufacturers' Association are: Chas. J. Deckman, Cleveland, president; Will P. Blair, Cleveland, secretary; C. C. Barr, Streator, Ill., treasurer.

The American Museum of Safety.

The First International Exposition of Safety and Sanitation ever held in America will take place in New York City, December 11 to 20, 1913, under the auspices of the American Museum of Safety. Safety and health in every branch of American industrial life, manufacturing, trade, transportation on land and sea, business, engineering, in all of their sub-divisions, will be represented at this exposition. It will be the first step toward making a representative exhibition of the progress of safety and preventive methods in America.

There will be absolutely no limit to the scope of the exposition. It will embrace everything devoted to safety, health, sanitation, accident prevention, welfare and the advancement of the science of industry.

By a special act of Congress, exhibits from Europe and other foreign countries are to be admitted free of duty. European employers have cut their accident and death rate in half by a persistent campaign for safety. There are 21 museums of safety in Europe. All of these various museums will contribute to the American exposition.

In the United States every year 40,000 workers are killed, and 2,000,000 are injured, while 3,000,000 are ill from preventable causes. A conservative estimate of the wasted wage earning capacity of the latter for one year is four hundred million dollars.

League of Minnesota Municipalities.

J. E. Jenks, city attorney of St. Cloud, and Prof. Richard R. Price of the University of Minnesota conferred at the university last week on an organization of a State League of Municipalities. It was decided to issue a call to every town and city in the state inviting them to send delegates to the first meeting to be held at the city hall in Minneapolis August 21. The call will be issued August 1, and will be signed by Prof. Price and the mayors of half a dozen of the leading cities that are interested. The league will be formed at the August meeting, Prof. Price said, and a convention probably will be held in the fall. Mr. Jenks returned to St. Cloud following his conference with Prof. Price. Before leaving he said he had received encouragement and promises of cooperation from every section of the state. Mayor Keller, Mayor Nye of Minneapolis and Mayor Prince of Duluth have approved of the plans of the university municipal worker. At the August meeting F. G. Pierce of Marshalltown, Iowa, editor of American Municipalities, official journal of the American Municipal League, and secretary of the organization, will read a paper on the work that can be done through a municipal league. Prof. Price will have a paper also on how the university can co-operate with the city officials.

PERSONALS

Hubbard, Provost, director of the division of roads and pavements of the Institute of Industrial Research, Washington, and lecturer in engineering chemistry in Columbia University, has been retained as consulting highway chemist by the Department of Efficiency and Economy of the State of New York.

Kingsley, E. R., state highway engineer, was made state organizer.

Lee, Charles, Glen Cove, L. I., N. Y., has been elected sewer commissioner.

Waters, W. W., Hot Springs, Va., was elected vice-president for Arkansas of the National Highways Association.

The following city officers have been elected: Illinois, Carthage—Mayor, J. B. Johnson. Texas, Carollton—Mayor, W. F. Vincent; City Marshal, H. C. Garrison; Aldermen, G. F. Warner, C. L. Lane, R. D. Smith, G. F. Myers, and D. E. Jackson.

MUNICIPAL APPLIANCES

PRIME MOVERS FOR ELECTRIC PLANTS.

Automatic High and Low Speed and Corliss Steam Engines—Internal Combustion Diesel Type—Gas and Gasoline Engines—Steam Turbines—Hydraulic Turbines.

RECIPROCATING ENGINES.

Prime movers for electric plants consist of reciprocating steam engines, gas engines, internal combustion engines, steam turbines and hydraulic turbines. According to the report of Chairman I. E. Moultrap to the National Electric Light Association, there have been during the past year no striking developments in any of the various forms of prime movers applicable to central-station use. Improvements in detail affecting efficiency have been made in water wheels, steam turbines, internal combustion engines and boiler room appliances. Vertical turbines are formed for water power units. There is a tendency towards higher speed for rotative elements of steam turbines. Steam turbines for driving station auxiliaries are reported to be bidding fair to supersede all other competitive apparatus.

Without attempting to describe the improvements in detail that have been made in the recent year in prime movers, we present below brief descriptions of some of the chief types of engines in actual use in municipal lighting plants.

Corliss engines are the old reliable prime movers which for half a century have stood the test for economy and low cost of maintenance. The distinctive features of the machine have been described by Prof. R. H. Thurston as follows:

1. The use of four valves—two steam and two exhaust—so placed as to reduce "clearance" to a minimum.

2. The use of a rotating valve, capable of being cheaply and readily fitted up, of being easily moved and of being conveniently worked by connections outside the steam spaces.

3. The use of a "wrist-plate," caused to oscillate by a single eccentric, and so directly connected with all four valves that each may be given a rapid opening and closing movement, and be held open and nearly still, at either end of its range, by swinging the line of connection nearly into the line between centers, thus permitting nearly a full opening of port to be maintained during an appreciable interval, and a free and complete supply and exhaust.

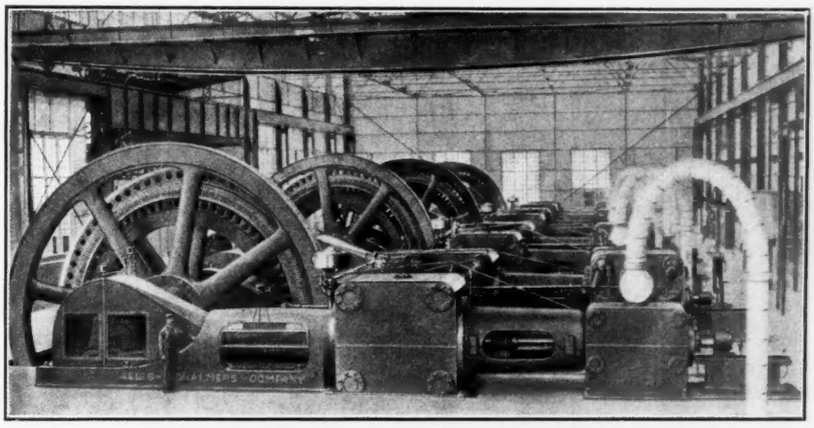
4. A beautifully simple and effective method of detaching the steam valve from the driving mechanism, and of insuring its rapid and certain closure at the proper moment, to produce any desired expansion of steam (the dash pots and their attachments).

5. A direct connection of the governor, so as to determine the ratio of expansion, while so adjusting the power of the engine to the work to be done that the variation of speed with changing loads becomes a minimum.

6. Making this latter adjustment in such a way as to throw the least possible work on the regulating mechanism, and thus to give the governor the greatest possible sensitiveness and accuracy of action.

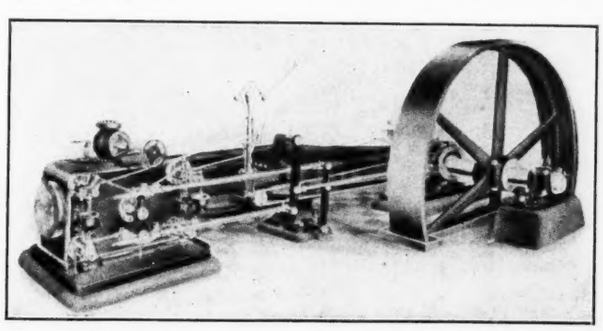
7. A form of frame and general design of engine which gives maximum strength and stiffness.

In the Corliss engine illustrated, made by the Allis-Chalmers Co., Milwaukee, Wis., the frame and slide are cast in one piece. All ribs and braces are inside the frame. The main bearing is of the four-part type, having bottom shell, two side shells and a cap. The bottom of the lower shell is spherical in form. The cylinder is fitted with Allis-Chalmers improved Corliss liberating valve gear of the long range type, under governor control up to three-quarters cut-off. The old style steam wrist plate has been omitted and a reach rod connects the two steam arms, making a construction well adapted to high speeds. Separate eccentrics are used for steam and exhaust valves. The dash pots are of the improved quick acting type with cushioning chamber arranged with a valve for adjustment. The governor is a high speed, single tension spring governor arranged to control the cut-off up to and including three-quarters stroke. The larger pistons are of the built-up type, with adjustable push ring, follower and two packing rings. The crosshead is of extra heavy box type, furnished with babbitt-faced, removable cast-iron shoes, turned and scraped to fit the bored guides and grooved for lubrication.

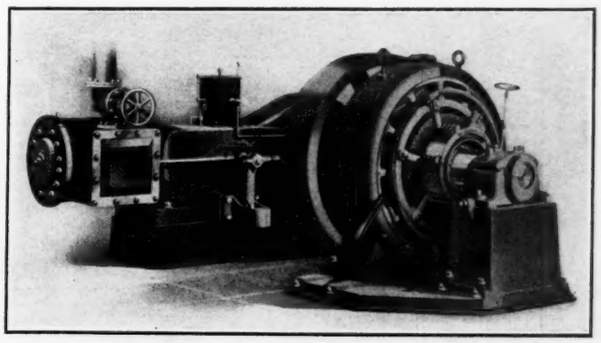


ALLIS-CHALMERS CORLISS ENGINES.

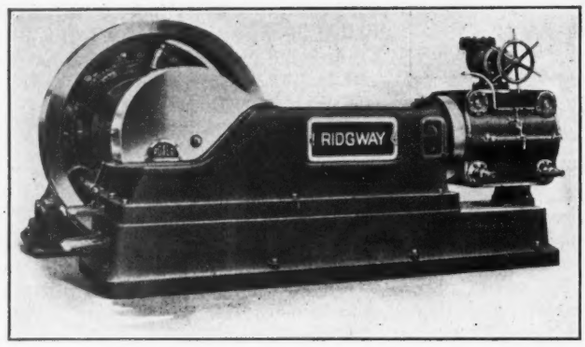
The Murray Iron Works, Burlington, Ia., make Corliss engines with a variety of types of frames. That illustrated is a box girder frame. For direct connection to generators, their rolling mill type might be preferred. In the cylinder of the Murray Corliss the exhaust passage is cast away from the cylinder, having a wide dead air space to avoid the loss of heat between cylinder and exhaust chamber. The steam valve is of the skeleton type, being driven by a T-head valve stem, opening with the current of steam rather than against it. The governor is of a high speed type, making from two to three revolutions to one of the engine. Pis-



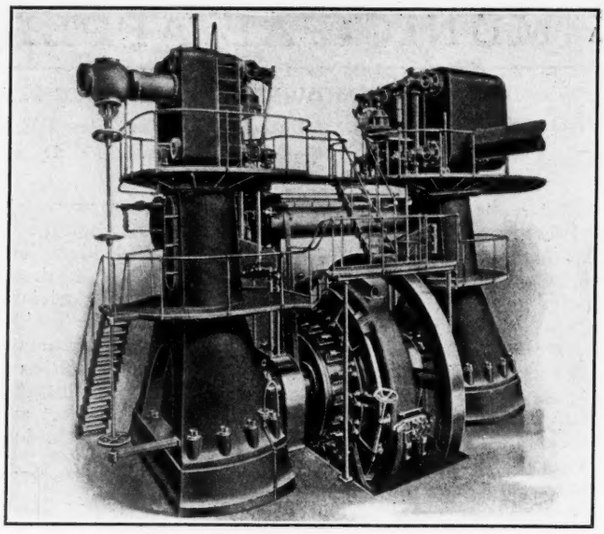
MURRAY CORLISS BOX GIRDER FRAME.



BALL SINGLE CYLINDER SIDE CRANK.



SIMPLE ENGINE, CRANK SIDE, RIGHT HAND.



VERTICAL CROSS COMPOUND CONDENSING RICE & SARGENT CORLISS ENGINE.

tons are either solid or built-up. The crosshead has shoes with a bearing the entire length of the crosshead. There is a device in connection with the valve gearing which stops the engine should the belt slip off. Murray engines run up to 125 revolutions per minute.

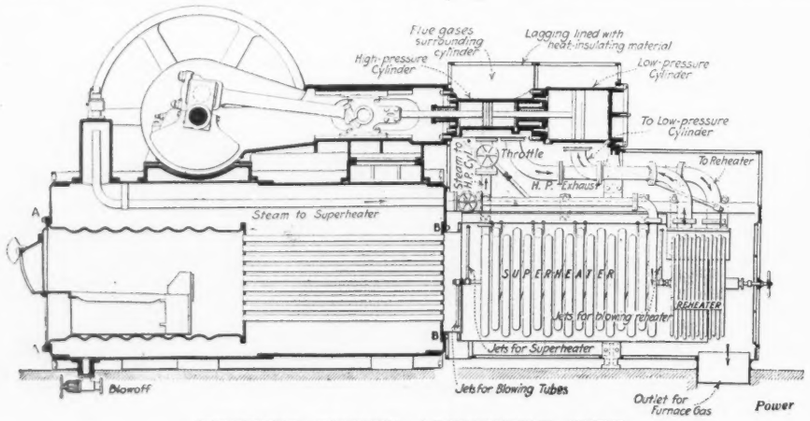
The Ball engine, made by the Ball Engine Company, Erie, Pa., illustrated herewith, is a single-cylinder side crank engine, of the single valve type. The same company makes a Corliss engine. The side crank type of engine avoids the undesirable feature of an overhanging wheel. This type also elimnates the necessity for three bearings in engines direct connected to generators. A simple device furnished with these engines serves to check the alignment. The main bearing is of unusual construction—it is a two part box. The parts are so designed that neither half quite touches the shaft at the place where the oil enters. All Ball engines are controlled by a shaft governor of unusual design. The Ball governor carries the weight directly on the spring, not transmitting its centrifugal stress through any bearing. Speed is increased or decreased by changing the tension of the spring. The sensitiveness is controlled by moving the link which connects the weight and the eccentric in or out along a row of holes.

In the cylinder a Sweet balanced valve is used. There is a patented device for taking up the wear of the valve.

The Ridgway Dynamo and Engine Co., Ridgway, Pa., makes a variety of engines much used in lighting plants. From these their four valve or so-called non-releasing gear Corliss engine has been selected for illustration. Whether this comes within the definition of the Corliss engine as given above is questionable. However, it has the four valves and high speed besides. High speed of rotation demands a gear which has a positive connection with the driving eccentric; high economy demands quick opening and closing of the valves. Good regulation requires the least possible amount of over-travel of the valve during the unbalanced period. In this engine there is mounted on the bed a cast-iron gear core (not shown in the cut) combined with the rocker bracket which supports the exhaust moist plate. The accelerating gear is a system of toggle joints by means of which the motion from the eccentric is so modified that the valves are at rest during the major portion of the unbalanced period, and opening and closing occurs when they have their maximum velocity.

The vertical cross-compound condensing engine illustrated is one of the types made by the Providence Engineering Works, Providence, R. I. Engines of this style carry direct connected generators of 1,500 to 4,000 k.w. capacity running 100 revolutions per minute. This is essentially a Corliss engine; the vertical type requiring less floor space than the horizontal.

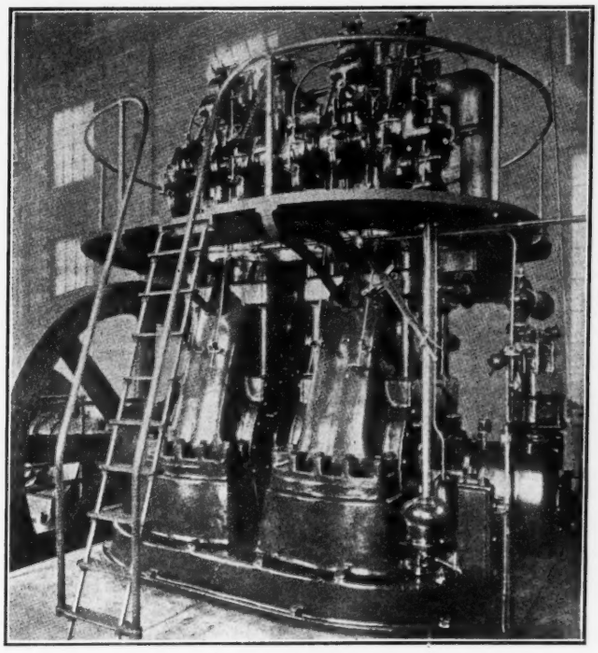
The Buckeyemobile, made by the Buckeye Engine Company, Salem, O., is a type of reciprocating steam engines called in Europe locomobiles. The machine is a complete self combined superheated steam power plant. They are suited for belted service, flexibly coupling and for direct connection to generator. They are made in sizes from 50 to 2,500 horse power, the larger engines being cross compound. The Buckeyemobile is a self-contained power plant for the effective utilization of superheated steam. It consists of a compound engine mounted on an internally fired boiler, the engine cylinders being enclosed in a smoke box which also contains a superheater, a reheater and all high pressure piping and valves as well as the intermediate piping. A special casing compels the hot gases as they leave the boiler tubes to traverse the superheater and reheater before emerging into the smoke box proper on the way to the stack. The engine drives a pump which feeds the boiler through a tubular heater in the exhaust line. The engine exhausts into a suitable condenser equipped with an air pump also directly driven from the main engine.



BUCKEYE ENGINE—LOCOMOBILE TYPE.

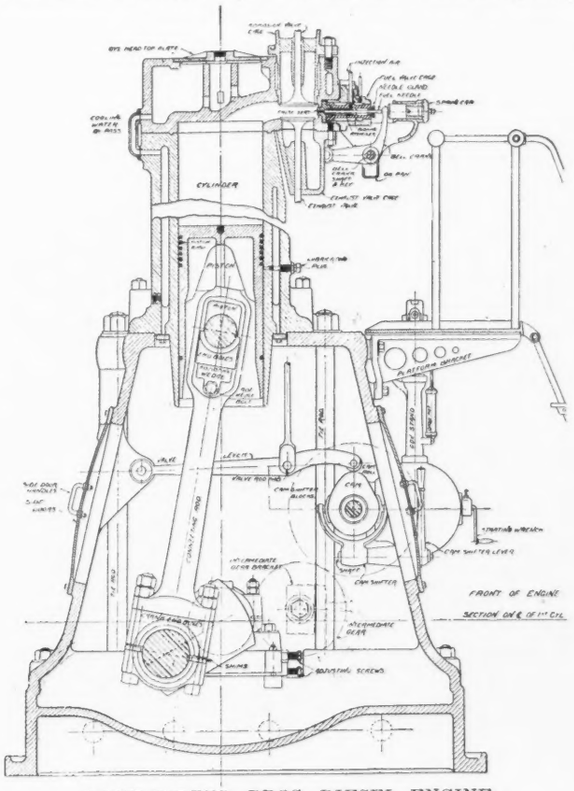
OIL AND GAS ENGINES.

The Lyons Atlas Company Indianapolis, Ind., make a crude oil engine of the Diesel type built in two, three and four cylinder vertical units of 300, 450 and 600 horse-power respectively. The illustration is that for two-cylinder unit. The principle of the internal combustion engine is simple. Air is fed into a cylinder and compressed to 500 pounds per square inch; this process heats the compressed air to a temperature of 1,000 degrees Fahrenheit. A fuel pump sprays small quantities of crude oil into the air chamber (cylinder); a complete burning of this fuel through the heat generated by the high compression of the air results. This moves the piston, applying the power to the main shaft. No ignition system, carburetor, fuel mixer or heating device of any kind is used. The manufacturers claim that on the basis of 2 cents per gallon for the fuel, adding the cost of operating, engineer and supplies and then figuring liberally for in-



LYONS-ATLAS INTERNAL COMBUSTION ENGINE.

terest and depreciation, the cost of current produced by an Atlas oil engine is less than 1 cent per k. w. h. The Atlas oil engine is of the vertical single acting enclosed type. The base under each series of cylinders is a separate casting of the deep box type, heavy, massive, amply reinforced, and with liberal surface in contact with the foundation. It contains the housings for the main shaft bearings and is carried well up around the cranks, the crank-case thus forming a suitable reservoir for lubricating oil. The A frame over each crank is cast in one piece with the cylinder and water-jacket. It fits tightly on the base, completely covering the crank pit, the upper end being arranged for rigid attachment of the cylinder head. The stresses in the cylinder are transmitted in straight lines to the base through four steel rods running directly from the bottom of each cylinder to four heavily reinforced anchoring places below the shaft bearings. The liner which constitutes the wall of each cylinder is cast separately from the cylinder head. The cylinder heads are unusually deep. Pistons are of the long trunk type, slightly tapered at the upper end to neutralize expansion. Each piston has seven snap rings. The admission, exhaust and fuel valves are positively driven. The admission and exhaust valves work in removable cages in the cylinder heads, and are driven through eccentrics and toe cams from the lay shaft located adjacent to the cylinders and are accessible for adjustment from the circular gallery.



BUSH-SULZER BROS. DIESEL ENGINE.

The Bush-Sulzer Bros.-Diesel Engine Co., St. Louis, Mo., make the internal combustion engine, of which a sectional view is presented.

It operates upon the Diesel four-stroke cycle, comprising the Diesel ignition-by-compression principle, as follows:

Stroke 1: Admission—Piston travels down or out, allowing cylinder to fill with fresh air at atmospheric pressure.

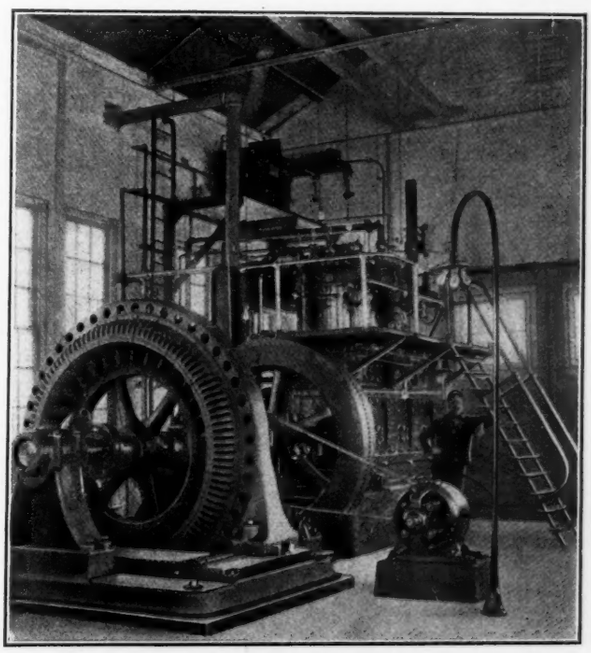
Stroke 2: Compression—Piston travels up or in, compressing air in cylinder. Compression heats the air so hot that oil fuel discharged into it will ignite and burn.

Stroke 3: Working—Down or Out—At the beginning of this stroke, when the crank is on dead center, the fuel valve opens and the fuel charge of oil is sprayed into the heated air of the cylinder by a jet of air separately compressed by a small compressor. The spraying extends over 12 per cent. of the working stroke of the piston and combustion is gradual, the resulting pressures being even and sustained and not explosive.

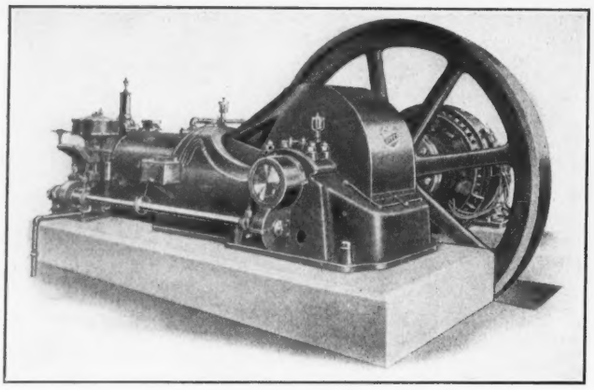
Stroke 4: Exhausting—When the piston reaches the lower or outer end of cylinder on stroke 3, the exhaust valve is opened, the pressure relieved, and the piston travels in or up, driving out the exhaust gases of combustion. This completes the cycle.

At the present time eighteen municipal plants use the Bush-Sulzer-Diesel Company's Diesel engines. Thirty-eight privately owned lighting and water plants use these engines.

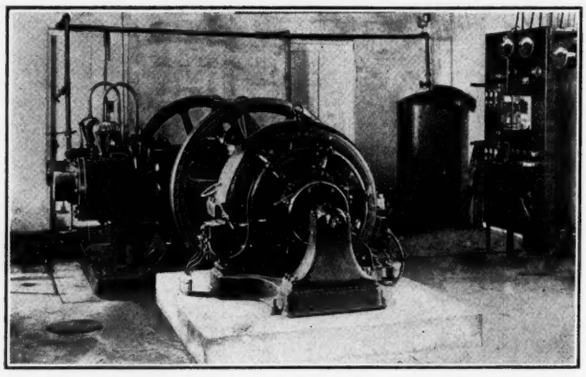
The Otto Gas Engine Works, Philadelphia, Pa., make engines of from 40 to 300 horse-power, designed to use natural, illuminating or producer gas, also gasoline, distillate and alcohol Otto engines, operated on the four-cycle principle; they draw in a charge of properly proportioned fuel and air, the volume being varied by a throttling



BRUCE-MACBETH NATURAL GAS ENGINE.



OTTO GAS ENGINE.



MIETZ & WEISS OIL ENGINE.

governor according to the load carried by the engine, insuring perfect combustion and highest thermal efficiency. The charge is compressed and ignited at the proper time, the resulting expansion imparting power to the crank shaft. On the return stroke the burnt gases are expelled through an exhaust valve, which is mechanically opened at the cylinder head of the engine. Close regulation of speed under varying load is secured by a heavy flywheel and throttling governor.

August Mietz Iron Foundry and Machine Works, 128 Mott street, New York, N. Y., make the Mietz and Weiss oil and gas engines in capacities up to 400 horse-power. A feature of this engine is that the heat resulting from the exploding charge is used to generate steam, which enters the charge to economize fuel. The steam is not used as a direct pressure agent, but, it is said, forms, together with the air and oil vapor, the explosive charge, and by partial dissociation, furnishes oxygen for combustion. A further advantage of this method lies in the automatic equalizing of the cylinder temperature.

The Bruce-Macbeth Engine Co., Cleveland, O., make vertical multi-cylinder gas engines which have given a good account of themselves in municipal service, operating on natural or producer gas. The manufacturer claims that the four-cylinder vertical balanced engine, like that shown in the illustration, is the highest type of internal combination engine yet built. The mechanically operated inlet and exhaust valves of poppet type are mounted in cages to allow free and easy removal from cylinder head without dismantling other engine parts. Each cylinder is bored to an accuracy of one-thousandth of an inch, and micrometer dimensions are taken and stamped on the upper edge of the cylinder. The design of the cylinders is entirely symmetrical. All main bearings are adjusted upward by means of wedges to maintain true alignment of the shaft. Cams, rollers and piston pins are of steel, hardened, ground and polished. Ignition is dual.

STEAM TURBINES.

The elementary principles of the steam turbine are now so generally known, and there is so much literature on the subject available, that any extended theoretical discussion would be superfluous. Broadly speaking, steam turbines are of two general classes; those employing the reaction principle and those employing the impulse principle.

In the reaction turbine, approximately one-half of the expansion in any one stage takes place in the stationary blades, imparting to the steam a velocity substantially equal to that of the moving blades, so that it enters them without impact. The remainder of the expansion takes place in the moving blades, the spaces between which gradually grow smaller from the inlet to the exit side of the turbine forming a ring of moving nozzles. The velocity imparted to the steam by reason of the expansion occurring in the moving blades, produces a reactive effort on these blades which turns the rotor of the turbine. This effect is very similar to that produced by water issuing from an ordinary hose nozzle.

In turbines of the impulse type the complete expansion for any one stage takes place in the stationary blades or nozzles, and the steam is delivered to the moving blades with a velocity somewhat more than double that of the blades. The passages between the moving blades are of uniform or even slightly increasing cross section from

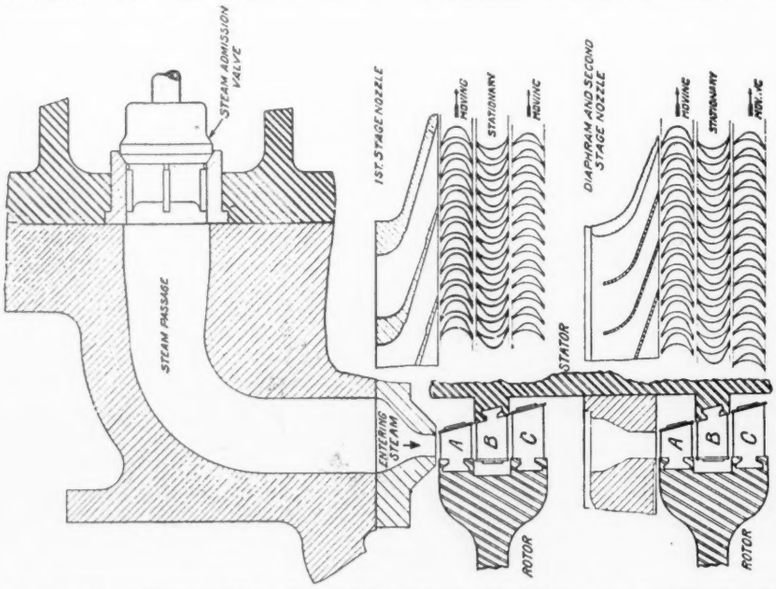
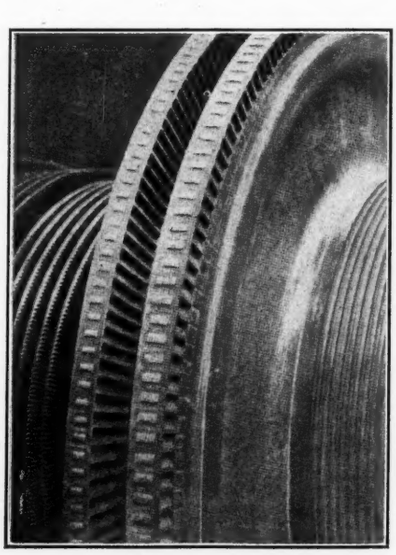
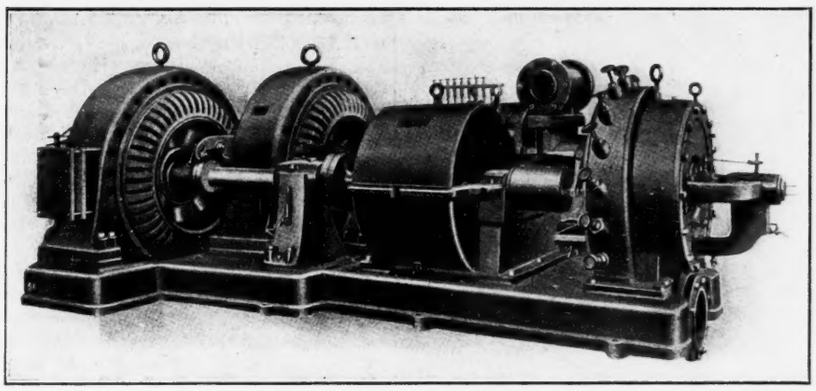


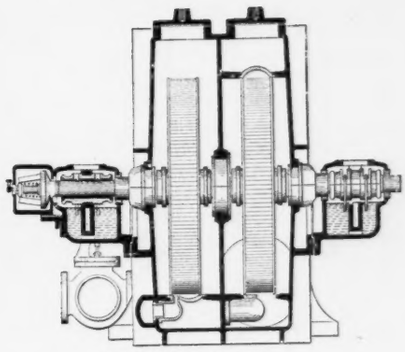
DIAGRAM SHOWING THE ARRANGEMENT OF NOZZLES AND BUCKETS IN A TWO-STAGE CURTIS TURBINE.



PORTION OF A COMBINATION IMPULSE AND REACTION ROTOR.



DE LAVAL SINGLE STAGE GEARED TURBINE.

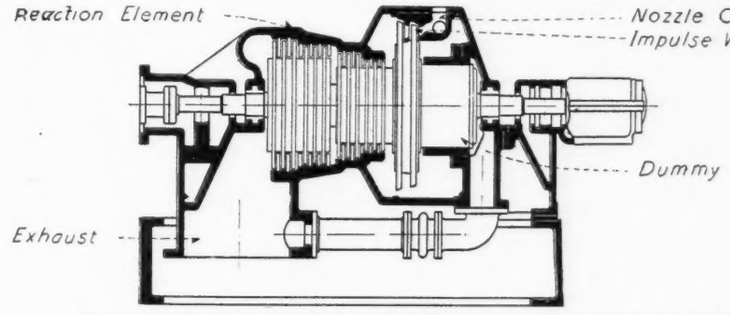


TERRY TURBINE.

inlet to outlet. The moving blades check and reverse the velocity of the steam current and the reluctance of the steam current to having its direction and velocity altered gives rise to a force against the blades which sets the rotor in motion.

Each of thes two general classes of turbines has its partisans, and doubtless always will have.

The General Electric Company, Schenectady, N. Y., are manufacturers of the Curtis turbines, which are of the impact type. The diagram shows the progress of the steam.



WESTINGHOUSE COMBINATION IMPULSE AND REACTION TURBINE.

The cut shows diagrammatically the progress of the steam in a Curtis turbine. Entering at A from the steam pipe, it passes into the steam chest B, and then through one or more open valves to the bowls C. The number of valves open depends on the load, and their action is controlled by the governor. From the bowls C, the steam expands through divergent nozzles D entering the first row of revolving buckets of the first stage at E, thence passing through the stationary buckets F, which reverse its direction and redirect it against the second revolving row G.

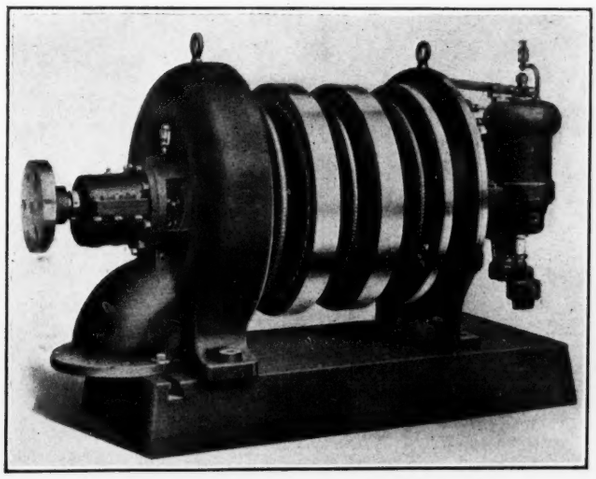
This constitutes the performance of the steam in one stage, or pressure chamber. Having entered the first row of buckets at E with relatively high velocity it leaves the last row G with a relatively low velocity, its energy between the limits of inlet and discharge pressure having been abstracted in passing from C to H. It has, however, a large amount of unexpended energy, since the expansion from C to E has covered only a part of the available pressure range. The expansion process is, therefore, repeated in a second stage.

The steam having left the buckets G, and having had its velocity greatly reduced, reaches a second series of bowls H, opening upon a second series of nozzles I. Through these the steam expands again from the first stage pressure to some lower pressure, again acquiring relatively high velocity in its expansion through these nozzles, leaving them at J and impinging upon and passing through the moving and stationary buckets K; L and M, precisely as in the first stage. Again the velocity acquired in the nozzles is expended in passing through the moving and stationary buckets and the steam leaves the second row M with relatively low velocity.

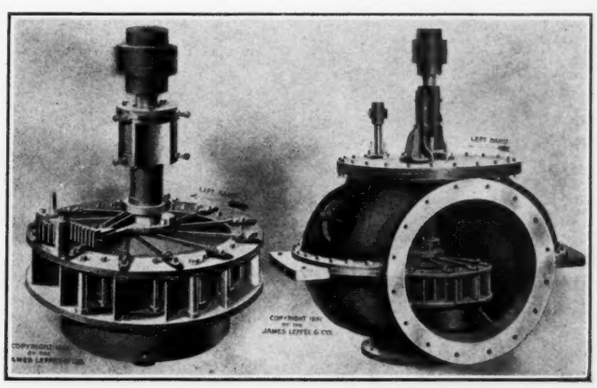
The Westinghouse Machine Company, East Pittsburgh, Pa., manufacture the Parsons turbine, which was originally a reaction turbine, but more recent designs combine both the impact and reaction principles. The illustration is of a section of a combination impulse and reaction single flow turbine.

The De Laval Steam Turbine Co., Trenton, N. J., turbines of many styles. The class C is distinguished by multiple velocity stages, but only a single pressure stage. They are made in sizes from 1 to 600 horse-power, and are made for direct connection to moderate or high speed machinery. Multiple turbines can be built of much greater horse-power than the class C machines. The combination of multi-staging with the use of reduction gears permit direct connection to standard speed direct current generators.

The Kerr Turbine Company, Wells-



KERR STEAM TURBINE.



LEFFEL HYDRAULIC TURBINE.

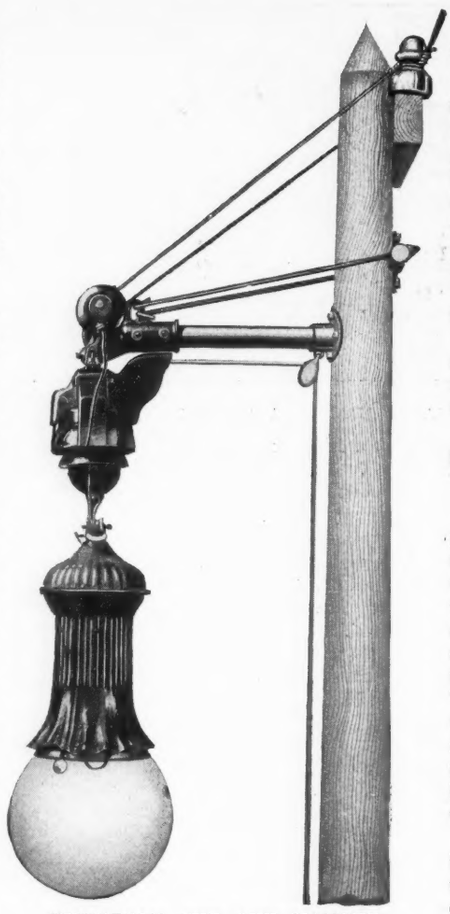
ville, N. Y., make the Economy turbine in capacities from 2 to 750 h.-p. An exhaust turbine capacity up to 450 h.-p. is a valuable machine. Economy turbines embody the simplest form of steam turbine construction. The nozzles are formed by monel metal vanes cast into the diaphragms. These vanes direct the flow of the steam into monel metal buckets when the usual reversal of direction takes place. They are built in multistage form, with from 2 to 10 stages.

The Terry Steam Turbine Co., Hartford, Conn., make turbines of from 3 to 300 h.-p. capacity. The suitability of the Terry turbine for driving electric generators is its low speed, which permits direct connection without belt or gears and practically eliminates commutation and bearing troubles.

Some cities are fortunate in having cheap water power. Hence an account of prime movers is not complete without some reference to water wheels. The illustration is that of a standard Leffel turbine and globe case which has been built by James Leffel & Company, Springfield, O., for forty-six years, but for many years with modifications. The globe casing is of comparatively late origin. Both of these are still built at the works of the company. Horizontal turbines are perhaps a design more frequently used now, and they are made by a number of manufacturers.

Cut-Out Hanger for Arc Lamps.

A simple and compact hanger to take the place of suspension equipment now used with series arc lamps has recently been put on the market by the Thompson Electric Company, Cleveland, O. By means of this hanger the lowering of any lamp in a series lighting circuit automatically cuts the lamp out of circuit without disturbing the operation of the other lamps. All wiring is carried in straight lines from the poles to the hanger, thus saving a considerable amount of wire and averting trouble incident to hanging loops, which under present practice cause a good deal of the arc lamp trouble. Again, since the lamp is detached from the circuit when lowered there is no danger from shock to the trimmer.



THOMPSON CUT OUT HANGER.

The illustration shows the hanger with the lamp in the operating position. The lamp can be disconnected and lowered by pulling the lowering rope. As will be noted, the lamp is supported by a double-fall rope so that the trimmer in lowering the lamp handles only one-half its weight. The lowering rope is looped under and at right angles to all live parts and is kept far enough away from the current-carrying parts to provide a high insulation to ground. It is stated that these hangers have withstood an electrical potential of 23,000 volts and on a mechanical test have supported a weight of more than 1,000 pounds.

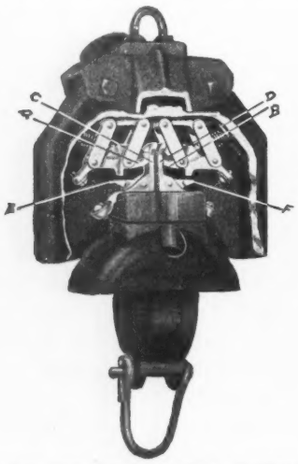
The smaller cuts show details and a partial section of the hanger with the lamp in various positions. Energy for operating the lamp enters through the bar A, passes through catch C, then through the lamp, returning through parts D and B, consecutively. Insulation between C and D prevents any arcing at this point. The letters E and F indicate pawls which hold the catches apart while the lamp is being lowered. The contacts are arranged to "wipe in" so that they will remain bright and clean.

Although the illustrations herewith show the hangers installed only from mast arms, they are also made in styles permitting their use on span wires.

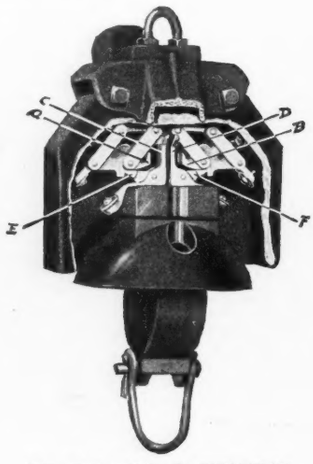
Stone Duct—A Molded Concrete Conduit.

The Chicago Stone Conduit Company, 435 The Rookery, Chicago, Ill., manufactures a concrete duct for electrical conduits, a machine for making which is shown in the illustration. The ducts are made by the Graham process which is claimed to produce pipe that is uniform under all conditions. The percentage of moisture used in the material at the time of pressing is said to be the least that will cause the initial setting of the cement. It is regulated by the pressure under which the machine is working.

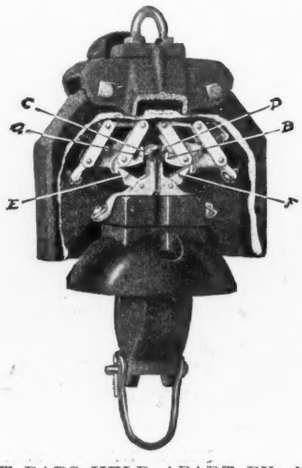
Material for each length of conduit is proportioned by weight into steel molds having the form of the length of pipe to be made. This mold contains a mandril form that is displaced by a larger mandril having tapered steel points. During the operation both revolve, and the tables holding the molds move parallel with the mandril. As the form is displaced by the tapered steel point, all inequalities in the filling are eliminated. The pressure under such a movement is directly outward from the wall of the conduit against the steel mold. The interior is said to be finished smooth as glass. This is important, as it minimizes the labor of rodding and cable drawing. The pipes are made in 6-foot lengths, and the ends are provided with metal rings. The rings are used for connecting sections and form a tight joint, making



LAMP IN OPERATING POSITION.



READY FOR LOWERING.

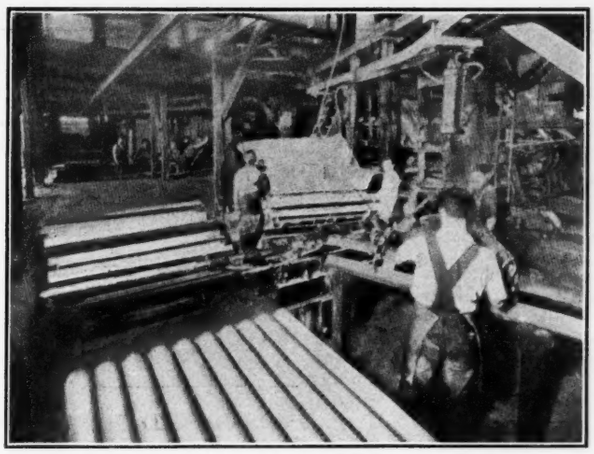


CONTACT BARS HELD APART BY PAWLS.

it impossible for any foreign articles to get into the duct.

The illustration shows the process of manufacture. The fine concrete, of which the ducts are made, is delivered to the hoppers. Two men tend the mold. This consists of two long sections of steel which together form a hollow cylinder. A metal core is held in position with one of these by clamps and the concrete tamped in. The upper steel shell is then added and the whole transported to the pressure molding machine. A steel mandril of the same size as the original core, except at one place where about one foot of its length is enlarged, is rotated while the mold is forced over it by a long screw, the original core being thus pushed out. The bore is thus smoothed and enlarged to 3¼ inches diameter, and the cylinder of concrete packed very hard. It is then withdrawn, the mold is opened, and the new conduit section is laid in a pile "on the half-shell" to dry out. After 48 hours of drying, the lengths of stone duct are removed and stood on end in piles.

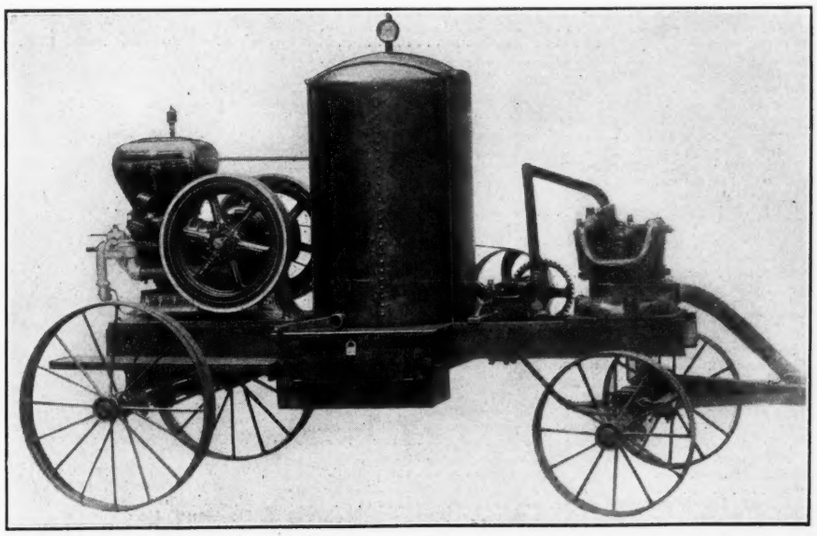
The next process is very important. Accurate as the machinery is, the junction of two sections might not make a perfect junction of the bores without it. The dry sections are placed in a turning lathe, in which is a round guide that just fits the bore. Outside of this at one end is a revolving chuck carrying several copper lugs into the end of which are set large black diamonds. As they revolve they cut a cylindrical surface on the outside of the stone duct, which is concentric with the bore, so that when the two sections are joined by means of a band the bore in the two sections is in accurate alignment.



MACHINE FOR MAKING CEMENT DUCTS.

Portable Power Plant for Outside Work of Water Departments.

At the recent Minneapolis convention of the American Water Works Association, the Water Works Equipment Co., 50 Church street, exhibited for the first time their portable air compressing plant further equipped with a diaphragm pump for pumping out ditches. With this machine on the line of his work the foreman in charge of pipe laying is prepared for pretty much anything he may encounter. With the aid of a hammer drill he can blast or break up ledges and boulders. If water is encountered the pump will handle it.no matter how muddy. Finally the joints may be calked with it. The Senior portable air compressor, as it is called, differs from all other plants of this kind. The engine and the compressor are combined in one machine. The air piston is connected on the same crank shaft as the engine piston making what is known as a double throw method which gives absolutely the same speed and power to the compressor as the engine. Another improvement is the piston discharge valve instead of the old style stem-valve makes it possible to reduce the valve space behind the air piston to a minimum. This valve also increases the efficiency about 15 per cent. and is practically indestructible. The compressor is also equipped with an unloader which automatically relieves the compressor at any desired pressure up to 125 lbs.



PORTABLE AIR COMPRESSOR AND PUMPING OUTFIT.

The engine is equipped with a magneto which makes the use of batteries unnecessary. The gasoline supply is retained in the base of the engine.

This plant will also, when equipped with the proper tools, cut pipe, drill rock, concrete or brick. It can be used for white washing, tree spraying, in fact, for anything to which compressed air is applied.

It is claimed to be the lightest, cheapest and most compact plant on the market. The company is prepared to furnish these compressors with or without calking hammers, air hose, etc.

INDUSTRIAL NEWS

Cast-Iron Pipe.—Birmingham manufacturers are receiving inquiries in larger volume, but the delay in the placing of municipal bonds has curtailed the business actually placed to quite an extent. The United States Cast Iron Pipe & Foundry Co. has just been awarded 800 tons of water pipe for export to Cuba, but it has not been decided from just what plant shipment will be made. An aggregate of 2,500 tons of water pipe for the requirement at Santiago, Cuba, has just been forwarded from local plants, and additional shipments are to follow. A fair volume of small orders for maintenance and extensions was placed in the week, and the average price consideration was about the same as was received in the week previous. The completion of the new plant at Boyles, Ala., is progressing satisfactorily, and it is proposed to put the new plant at Anniston, Ala., into operation by November 1. This plant will probably produce a portion of the tonnage recently entered by the Lynchburg Pipe & Foundry Co. for the requirement at Cleveland, O. Quotations are not revised, and are as follows per net ton f. o. b. cars at Birmingham, viz.: Class "B," or water pipe, 4-inch, $22.50; 6-inch and 8-inch, $20.50; larger sizes, average $20, with $1 per ton extra for gas pipe.

Engineering Firm.—An engineering firm, to be known as Cellarius & Dressler, has been formed by Fred J. Cellarius, former city engineer, Dayton, O., and Harvey J. Dressler, former assistant city engineer, who will occupy room 1001 in the Commercial Building, Dayton, O. It is the purpose of the new organization to devote special attention to surveys, subdivisions and development of property and city planning, being equipped also to prepare plans, estimates, specifications and supervision for paving, sewerage, bridges, railroads and concrete construction.

WEEKLY CONTRACT NEWS

ADVANCED INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS	
O.,	New London	noon, Aug. 9	Improving two streets	W. I. Bracey, City Clerk.
O.,	LaGrange	10 a.m., Aug. 9	Blast furnace slag, 2,700 tons	F. Walcott, Clerk.
Ill.,	Rock Island	9 a.m., Aug. 9	Cement sidewalks	H. M. Schriver, Mayor.
N. H.,	Concord	Aug. 9	Gravel and macadam	S. P. Hooker, Supt. Hwys.
Ill.,	Belleville	Aug. 10	Macadam	W. C. Wolf, City Engr.
O.,	Canton	10 a.m., Aug. 11	Culvert	J. H. McConnell, Co. Aud.
Tenn.,	Johnson City	7 p.m., Aug. 11	Brick, asphaltic concrete, tarvia, etc., 17,000 sq. yds	P. F. McDonald, City Comr.
Cal.,	Fresno	Aug. 11	Road, 4.8 miles	Supervisors.
N. J.,	Newark	3 p.m., Aug. 11	Paving Myrtle Ave.	F. A. Reimer, Co. Engr.
Ind.,	South Bend	11 a.m., Aug. 11	Imp. highway	C. Sedgwick, Aud.
Ala.,	Montgomery	Aug. 11	Gravel, 4 miles	Co. Comrs.
N. J.,	New Brunswick	2.30 p.m., Aug. 11	Concrete and steel culvert	A. J. Gebhardt, Dir.
Ind.,	Albion	1 p.m., Aug. 11	Paving	City Clerk.
Tex.,	Dallas	11 a.m., Aug. 11	Grading roads	G. L. Fearn, County Auditor.
Ala.,	Tuskegee	11 a.m., Aug. 11	Top soil roads; cost, $4,000	W. S. Keller, Hy. Engineer.
Ind.,	La Porte	Aug. 11	Vitrified brick, 4,300 yds	E. C. Silvercraft, City Eng.
O.,	Alliance	noon, Aug. 11	Paving sidewalks, etc	D. M. Armstrong, Dir.
O.,	Crestline	noon, Aug. 11	Improving Thoman St	M. J. Strauch.
O.,	Youngstown	1.30 p.m., Aug. 11	Slag macadam	E. E. Smith, Eng.
Ill.,	Geneva	2 p.m., Aug. 12	Cement walks	J. B. Dibelka, Chicago.
Ill.,	Chicago	4 p.m., Aug. 12	Granite block paving	Geo. A. Mugler, Sec.
Ind.,	Logansport	Aug. 12	Macadam	C. R. Lybrook, Co. Surv.
Minn.,	Crookston	Aug. 12	Westrumite, 9,800 yds.	A. M. Childs, City Clk.
N. J.,	Long Beach	Aug. 12	Gravel roads, 2,867 lin. ft.	W. H. Ford, Engr.
Conn.,	Waterbury	8 p.m., Aug. 12	Vitrified brick or small granite blocks on present foundation	R. A. Cairns, C. E.
N. J.,	Woodbridge	8.30 p.m., Aug. 12	Macadam, 2,000 lin. ft	A. Keyes, Township Clk.
Mass.,	Boston	noon, Aug. 12	Highway in Plymouth, 10,500 lin. ft	W. D. Sohier, Ch.
N. Y.,	Brooklyn	11 a.m., Aug. 13	Iron slag and asphalt block, sheet asphalt	L. A. Pounds, Pres.
N. J.,	Freehold	11 a.m., Aug. 13	Gravel road	J. M. Corlies, Dir.
O.,	Lorain	noon. Aug. 13	Pavement, 35,000 yds	C. M. Osborn, City Eng.
O.,	Canton	10 a.m., Aug. 13	Improving roads	J. H. McConnell, Co. Auditor
Ala.,	Ozark	noon, Aug. 13	Sand clay roads, 6 miles; cost, $8,000	W. S. Keller, Hy. Engr.
Ind.,	Madison	11 a.m., Aug. 14	Paving county line road	A. M. Taft, Co. Auditor.
Ind.,	Ft. Wayne	7.30 p.m., Aug. 14	Sheet asphalt, bituminous concrete, wood, etc	H. W. Becker, Clk.
Md.,	Towson	Aug. 14	Macadam road; cost, $9,100	H. G. Shirley, Engr.
Pa.,	Exeter	8 p.m., Aug. 14	Vitrified brick	W. F. Dougherty, Sec.
O.,	Cincinnati	noon, Aug. 15	Improving road	S. Struble, Pres.
N. J.,	Elizabeth	8 p.m., Aug. 15	Granite block, brick, trap rock, etc	W. P. Neafsey, Comr.
Ind.,	Anderson	Aug. 15	Vitrified brick	W. O. McVaugh, Co. Surv.
Ill.,	Oakland	Aug. 15	Vitrified brick and asphaltic macadam	C. James, Eng.
O.,	Tippacanoe City	noon, Aug. 15	Improving Main St	S. O. Mitchell, Vil. Clerk.
Wis.,	Kenosha	2 p.m., Aug. 15	Vitrified brick	D. O. Head, Ch.
Mex.,	Ensenada	3 p.m., Aug. 15	Cement walks, 3,280 lin. ft	David Zarate, Pres.
Utah,	Ogden	10 a.m., Aug. 15	Sidewalks	H. J. Craven, City Eng.
Ind.,	Rensselaer	1.30 p.m., Aug. 16	Improving roads	A. B. Lowman, Supt.
Wash.,	Walla Walla	Aug. 16	Improving highway, 14 miles	W. J. Roberts, Secy.
O.,	Scio	noon, Aug. 16	Concrete, 17,000 yds.	H. E. Johnson, Vil. Clk.
O.,	Cleveland	11 a.m., Aug. 16	Improving road	J. F. Goldenbogen, Co. Clk.
N. J.,	Red Bank	8 p.m., Aug. 18	5,300 sq. yds. street paving	A. C. Harrison, Boro. Clk.
N. Y.,	Albany	1 p.m., Aug. 18	Repairing highways	J. N. Carlisle, Comr.
Ala.,	Montgomery	Aug. 18	Gravel roads, 3 miles	Bd. Revenue.
N. Y.,	Binghamton	1 p.m., Aug. 18	Repairing state highway	J. M. Carlisle, Comr.
Cal.,	Sacramento	2 p.m., Aug. 18	Concrete and bituminized surface, 8 miles	A. B. Fletcher, Hy. Eng.
N. Y.,	Albany	1 p.m., Aug. 19	Repairing highways	J. N. Carlisle, Comr.
Ala.,	Abbeville	1 p.m., Aug. 19	Sand clay roads	W. S. Keller, Hy. Eng.
O.,	Toronto	noon, Aug. 19	Grading, draining, curbing and paving	Jas. Connor, Vil. Clk.
O.,	Cleveland	Aug. 20	Improving roads	J. F. Goldenbogen, Clk.
O.,	Logan	noon. Aug. 26	Improving Walnut St	C. A. Rochester, Vil. Clerk.
Ind.,	Logansport	11 a.m., Sept. 5	County line highways	J. E. Walls, Co. Aud.
			SEWERAGE	
Pa.,	Bristol	Aug. 9	Sewers	H. H. H. Poole, Clk.
Neb.,	Neligh	Aug. 9	Sewer laterals	O. S. Hauser, City Clk.
Ind.,	Decatur	10 a.m., Aug. 9	Drain	P. L. Macklin, Co. Surv.
O.,	Carey	noon, Aug. 11	Tiled ditch	D. C. Angus, Vil. Clerk.
O.,	Alliance	noon, Aug. 11	Storm and sanitary sewers	D. M. Armstrong, Dir.
Tenn.,	Johnson City	Aug. 11	Vitrified pipe, 6,700 ft. 6 to 12-inch	P. F. McDonald, Comr.
Ill.,	Highland Park	noon, Aug. 12	Sewers, drains, pavements, etc	Winds & Marsh, Winnetka Ill
O.,	Cleveland	noon, Aug. 12	Culvert	W. J. Springborn, Dir.
Pa.,	Mt. Lebanon	4 p.m., Aug. 12	Septic tank, disinfecting chamber, etc	Comrs.
O.,	Dayton	Aug. 12	Storm sewers, 20 streets	R. P. Sebold, Dir.
Idaho,	Kellogg	8 p.m., Aug. 12	Sewers, 16,000 ft. 6 to 12-inch	W. T. Simons, City Clk.
N. Y.,	Balston Spa	8 p.m., Aug. 12	810 ft. 6-in. pipe	W. H. Lawrence, Vil. Clk.
Ind.,	Peru	Aug. 12	Pipe sewers	Horan, City Eng.
Mo.,	St. Louis	noon, Aug. 12	Concrete sewers	E. R. Kinsey, Pres. Bd.
Neb.,	David City	7.30 p.m., Aug. 13	Sewers	Thompson, City Clk.
N. Y.,	Schenectady	2.30 p.m., Aug. 13	Portion of intercepting sewer	F. E. Johnson, Sec. Bd.
Can.,	Bassano	Aug. 15	Tank, filter, etc	G. R. Bond, Sec.
O.,	Tippecanoe	noon, Aug. 15	Storm sewer	S. O. Mitchell, Vil. Clerk.
N. J.,	Elizabeth	8.30 p.m., Aug. 15	Sewer	W. P. Neasey, Comr.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Wis.,	Lake Geneva	8.30 p.m., Aug. 15.	Vitrified pipe, 13,000 ft. 6 to 12-inch	A. G. Bullock, City Clerk.
La.,	New Orleans	noon, Aug. 15.	Extension to pumping station, Contract 55D	F. S. Shields, Sec.
Wis.,	Lake Geneva	Aug. 16.	Vit. pipe, 14,000 ft. 6 to 12-in.	A. Bullock, C. Clk.
N. C.,	Hamlet City	Aug. 16.	Sanitary sewer system, 6 miles pipe	H. P. Austin, Ch.
Minn.,	Winona	Aug. 18.	Vitrified pipe, 11,000 ft. 8-inch	H. B. Walling, City Eng.
Can.,	Toronto	Aug. 19.	Midway sewer system	H. C. Hocken, Mayor.
Okla.,	Sulphur	2 p.m., Aug. 19.	Sanitary sewer system	C. S. Ucker, Washington.
Va.,	Apalachia	2 p.m., Aug. 19.	Sewerage system; cost, $21,000	E. A. Collins, Reporter.
Kan.,	Halstead	Aug. 20.	Sewer system; cost, $33,000	J. D. Lange, City Clk.
O.,	Akron	11 a.m., Aug. 20.	Storm sewer	C. L. Bower, Clerk.
O.,	Liberty Center	noon, Aug. 23.	Several sewers	R. A. Beilharz, Vil. Clerk.
Ill.,	DeKalb	Aug. 25.	Tile pipe, 16 miles, 8 to 24-in.	M. J. Henaughan, Pr. B. L. I.
N. J.,	Newark	2 p.m., Sept. 9.	Outfall pressure tunnel	Passaic Valley Sewerage Cmrs

WATER SUPPLY

O.,	Lima	noon, Aug. 9.	Water supply system for hospital	S. A. Hoskins, Pres.
Ill.,	Stockton	Aug. 9.	Concrete reservoir, 500,000 gal. capacity	G. H. Brown, Vil. Clk.
Miss.,	Sumner	Aug. 11.	Drilling artesian well	City Clk.
Neb.,	Bristow	Aug. 11.	Water works; cost, $7,000	A. Olson, Vil. Clk.
S. D.,	Beresford	Aug. 11.	Well, 700 ft. deep	F. Bruehler, C. Aud.
Ida.,	Kellogg	Aug. 12.	Sewer system	W. T. Simons, City Clk.
N. Y.	Hempstead	Aug. 12.	Two 150 H. P. boilers and brick chimney	E. P. Parsons, Clk. of Bd.
W. Va.,	Barboursville	Aug. 12.	Water system	City Clerk.
Mass.,	Boston	11 a.m., Aug. 12.	Reservoir, etc., at Fort Strong	Q. M.
Ill.,	Winetka	8 p.m., Aug. 12.	Cast-iron pipe, etc	Windes & March, Engrs.
N. J.,	Trenton	2.30 p.m., Aug. 13.	Cleaning 25,000 ft. 4 to 12-inch mains	F. Thompson, City Clk.
Cal.,	Pasadena	10.30 a.m., Aug. 15.	Riveted steel water pipe, 10,000 lin. ft. 7 to 16-inch; 1,080 ft. cast-iron pipe and specials	H. Dyer, City Clk.
Ky.,	Henderson	1.30 p.m., Aug. 16.	Water tube boiler, 400 H. P.	L. P. Hite, Supt.
Minn.,	Milaca	8.30 p.m., Aug. 18.	Water mains, 750 ft. 6-inch	B. A. Baldowsky.
Cal.,	Oxnard	Aug. 19.	Water tower	G. R. Beallah, City Clk.
N. C.,	Weldon	Aug. 20.	Water works and sewerage system	W. C. Riddick, Engr.
Ore.,	Pendleton	Aug. 26.	Gravity water system; cost, $200,000	F. C. Kelsey, Engr.
O.,	Akron	Aug. 26.	Purification plant	R. M. Pillmore, Dir.
Miss.,	Georgetown	Sept. 1.	Water works	D. Mahaffy, Twn. Clk.

LIGHTING AND POWER

Manitoba,	Winnipeg	Aug. 9.	Motor generator, 1,000 k.w.	M. Petersen, Secy.
N. J.,	South River	8 p.m., Aug. 11.	Gas producer, gas engine and generator switchboard	C. Anderson, Boro. Clk
O.,	Cleveland	noon, Aug. 11.	Steel work for light plant	W. J. Springborn, Dir. P. Serv.
S. D.,	Mobridge	Aug. 11.	Ornamental lighting poles	W. L. Youngman, City Aud.
Mass.,	Holyoke	2 p.m., Aug. 15.	Furnishing cable and drawing same into ducts	J. J. Kirkpatrick, Mgr.
Iowa,	Spencer	Aug. 15.	Corliss engine, 12 by 36	E. M. Smith, City Clk.
Mass.,	Westboro	noon, Aug. 15.	Power house for hospital	Trustees.
Kan.,	Topeka	2 p.m., Aug. 16.	Power house and tunnel	H. J. Waters, Pres.

FIRE EQUIPMENT

Minn.,	Mankato	9 a.m., Aug. 11.	Motor Triple combination engine	F. W. Bates, City Clerk.
N. Y.,	Brooklyn	10.30 a.m., Aug. 12.	Building engine house and remodeling	Jos. Johnson, Comr.
Ga.,	Augusta	Noon, Aug. 14.	Fire department house	G. W. Wright, Ch.
Mich.,	Saginaw	7.30 p.m., Aug. 15.	Motor combination chemical and hose wagon	G. C. Warren, City Compt.
O.,	Akron	noon, Aug. 16.	Fire station	D. P. Stein, Director.

BRIDGES

O.,	Defiance	2 p.m., Aug. 11.	Bridge and abutments	S. I. Guener, Co. Aud.
N. J.,	Camden	10.30 a.m., Aug. 11.	Bridge	F. W. Gercke, Ch. Com.
O.,	Zanesville	Aug. 11.	Bridges	H. H. Kennedy, Co. Clk.
Ind.,	Lagoda	10 a.m., Aug. 11.	Concrete bridge	C. H. Hill, Trustee.
Ala.,	Oak Grove	noon, Aug. 11.	Concrete bridge	Bd. of Revenue.
Okla.,	Chandler	2 p.m., Aug. 11.	Concret arch	R. P. Roope, Clerk.
Kan.,	Independence	noon, Aug. 12.	Concrete bridges	G. A. Otwell, Co. Clerk.
Ill.,	Willard Hill	2 p.m., Aug. 12.	Concrete bridges; cost, $4,600	J. W. Neal, Town Clerk.
Il.,	Paxton	1 p.m., Aug. 12.	Concrete bridges; cost, $1,200	V. E. Johnson, Town Clerk.
Ind.,	Anderson	10 a.m., Aug. 15.	Concrete arch	J. B. Bennefiel, Co. Audr.
Wis.,	Eau Claire	Aug. 15.	Concrete bridge; cost, $75,000	J. C. Fennessey, City Clerk.
Ind.,	Muncie	Aug. 16.	Several bridges	Co. Auditor Williams.
O.,	Jefferson	1 p.m., Aug. 18.	Culverts	J. S. Matson, Co. Eng.
Minn.,	Montevideo	8 p.m., Aug. 18.	Concrete foot bridge	A. M. Parks, City Clerk.
O.,	Niles	Aug. 18.	Bridges	W. R. Harrington, Co. Clk.
Kan.,	Wichita	Aug. 18.	Several concrete bridges	E. B. Moore, Co. Engr.
O.,	Lebanon	11 a.m., Aug. 18.	Retaining wall	T. C. Patterson, Co. Aud.
O.,	Akron	11 a.m., Aug. 18.	Substructure	C. L. Bowers, Co. Clk.
O.,	Springfield	10 a.m., Aug. 18.	Bridge floor	F. Hirtzinger, Pres.
Ga.,	Macon	9 a.m., Aug. 19.	Concrete bridges (four)	J. R. Bowdre, Clk.
Neb.,	Nebraska City	noon, Aug. 19.	45-5ft concrete arch bridge	L. Stutt, Co. Clk.
Mo.,	Kansas City	2 p.m., Aug. 19.	Viaduct	M. A. Flynn, City Compt.
O.,	Hamilton	10 a.m., Aug. 20.	Bridge	W. W. Crawford, Co. Aud.
O.,	Canton	10 a.m., Aug. 20.	Bridges	J. H. McConnell, Co. Aud.
O.,	Cleveland	11 a.m., Aug. 20.	Concrete steel bridge	F. R. Lander, Co. Surv.
O.,	Massillon	10 a.m., Aug. 20.	Miscellaneous bridge work, including paving	J. H. McConnell, Co. Aud.
Ind.,	Evansville	10 a.m., Aug. 21.	Bridge approaches	C. P. Beard, Co. Auditor.
O.,	Akron	noon, Aug. 29.	Substructure and paving of bridge	C. L. Bower, Clk.

MISCELLANEOUS

N. D.,	Bismarck	2 p.m. Aug. 9.	Automobile tags, 15,000	T. Hall, Sec. State.
N. J.,	Roosevelt	8.30 p.m., Aug. 11.	Rebuilding borough hall	J. A. Hermann, Mayor.
N. Y.,	Lockport	10 a.m., Aug. 11.	Almshouse	F. H. Krull, Clerk.
Tex.,	Dallas	11 a.m., Aug. 11.	Automobile, 5 passenger	G. L. Fearn, Co. Auditor.
O.,	Toledo	noon, Aug. 11.	Gasolene runabout	F. B. Respess, Sec.
N. J.,	Roosevelt	8.30 p.m., Aug. 11.	Rebuilding borough hall	J. A. Hermann, Mayor.
O.,	Dayton	noon, Aug. 11.	Steam or gasolene roller, ten-ton	R. P. Sebold, Dir.
O.,	Toledo	noon, Aug. 11.	Ten-inch sand pump	F. G. Stockton, Sec.
Ga.,	Fitzgerald	noon, Aug. 12.	Jail cells, two	W. R. Walker, Ch.
N. J.,	Irvington	8 p.m., Aug. 12.	Pool for playground	I. J. Casey, Jr., Engr.
N. Y.,	Schenectady	2.30 p.m., Aug. 13.	Market building, plumbing, wiring, etc	F. E. Johnson.
Pa.,	Fairhaven	Aug. 13.	Furnishing 10-ton road roller	W. A. Bode, Sec.
N. J.,	Atlantic City	11 a.m., Aug. 13.	Garage, store room, etc	S. Winterbottom, Ch. Comrs.
Pa.,	Baldwin	7 p.m., Aug. 13.	Ten-ton road roller	W. A. Bode, Sec.
N. Y.,	Binghamton	4 p.m., Aug. 13.	Improvements to hospital	F. M. Hopkins, Clk.
Tex.,	Center	Aug. 13.	County building; cost, $14,000	E. W. Hooker, Judge.
N. Y.,	Schenectady	2.30 p.m., Aug. 13.	Band stand and comfort station in park	F. E. Johnson, Sec.
O.,	Dayton	noon, Aug. 15.	Automobile truck chassis, also truck complete; capacities 1 or 2 tons	E. H. Kerr, Ch. Bd. Education.
Can.,	Kerriesdale	Aug. 18.	Incinerator, 25 tons capacity	G. G. Heighway, City Clk.
R. I.,	Woonsocket	2 p.m., Aug. 25.	High school building, including wiring, etc	G. A. Smith, Secy.
Tex.,	Austin	Aug. 26.	Hospital	W. B. Anthony, Comr. Public Safety.

STREETS AND ROADS

Foreman, Ark.—A committee has been appointed to secure estimate on paving all roads leading into the city with gravel.

Gadsden, Ala.—Ordinance has been passed authorizing improvement of certain portions of South Fifth street and West Cherry street by constructing artificial stone curbs and gutters.

Phoenix, Ariz.—R. N. Davidson, secretary of the Linney Amendment Initiative Assn., is circulating petition for amendment to constitution providing for bond issues for good roads and other purposes. It is proposed to change the limit from the present maximum of 355 to 10 per cent. of the assessed valuation of the state.

Hemet, Cal.—City trustees of Hemet have voted to lay 10 miles of cement curbs and sidewalks and to macadamize all principal streets of city.

Los Angeles, Cal.—Public works committee of city council has decided to recommend that city engineer be instructed to prepare specifications for paving of West 8th street with asphalt.

Marysville, Cal.—Bringing in D st. up to official grade and surfacing it in same manner as other improved streets, in portion between Ninth and Tenth sts. where the thoroughfare cuts through Ellis Lake, is the program of City Council between now and end of their term next April.

Oakland, Cal.—Widening of Washington st. is being discussed.

Pomona, Cal.—Good roads bond election will be held Sept. 10. Ordinance calls for improvement of First st., Oak ave., Second st., Garey ave., Holt ave., Lordsburg road, known as Mud Springs road, and San Antonio ave. Estimated cost for improvement is $75,000.

Bridgeport, Conn.—Paving of various streets are being discussed.

Hartford, Conn.—Council has approved the recommendation of the Board of Public Works authorizing the signing of the contract for the paving of West Main st. with amiesite. Cost, $7,300.

Tampa, Fla.—Hillsboro county voters have decided to issue $1,000,000 bonds in laying brick highways.

Albany, Ga.—City has authorized $12,500 bonds for street paving. H. A. Tarver is mayor.

Ottawa, Ill.—A concrete highway from business section of La Salle across Shippingsport bridge over new Illinois Central bridge through Deer Park township to State Park is being planned.

Peoria, Ill.—Cost of widening Knoxville ave. for two blocks is estimated to cost $58,000. Improvement calls for street 66 ft. wide.

Fort Wayne, Ind.—Resolutions have been adopted for improvement of various streets. H. W. Becker is Clerk.

Leavenworth, Kan. — Platte County Commissioners have designated a number of roads to be paved between Platte and Leavenworth.

Pittsburg, Kan.—Pittsburg Chamber of Commerce will cooperate with citizens of Barton County, Missouri, for building a road from Pittsburg to the county line. This will connect with highway to be built from Lamar west.

Winchester, Ky.—Letcher county will begin constructing six miles of roadway from Mayking to Kona.

Benton, La.—Bossier Parish has voted $175,000 bonds for road construction.

Lake Charles, La.—The Commissioners are about ready to let contracts for many miles of street paving.

New Orleans, La.—Commissioner of Public Property E. E. Lafaye has reported favorably petitions for paving with R. S. Blome granitoid pavement, Clouet st.; for repaving with pitch lake asphalt the river side of North Rampart st.

Augusta, Me.—Governor Haines has decided to offer bonds for construction of state highway to the amount of $2,000,000 for sale directly to the public without the intervention of brokers.

Dexter, Me.—Street Commissioner Arthur R. Levenseller will soon begin work on the state road on Church st.

Rising Sun, Md.—The Cecil county commissioners will improve Rising Sun public road to James Evans' lane, distance of two miles.

Boston, Mass.—Order has been passed by council providing $100,000 for widening Chelsea st., $99,000 for widening Norfolk street, $100,000 for widening Centre st., in West Roxbury, $55,000 for widening Hyde Park ave., $50,000 for widening North Beacon st., $50,000 for widening Faneuil street, $25,000 for widening Amory st., and $20,000 for extension of Neptune ave.

Gloucester, Mass.—Widening of Witham st. is being considered.

Saginaw, Mich.—Loan of $90 000 for street improvement has been authorized.

Grand Rapids, Mich.—Council has ordered paving of Bartlett st. with brick.

Ripley, Miss.—Bonds in sum of $20,000 for road construction have been voted by Tippah county.

Duluth, Minn.—Paving of 59th ave. west is being discussed.

St. Paul, Minn.—Bonds will shortly be sold for improvement of Snelling ave.

Chillicothe, Mo.—City Engineer Jo Broaddus has been instructed to prepare plans and specifications to present to Council at next regular meeting for paving of Clay st. entire length from east city limits to west city limits with Dolarway paving.

St. Joseph, Mo.—On July 28, the Board gave 15 days for selecting materials for three streets.

St. Joseph, Mo.—Upon order of Board of Public Works ordinance was drawn up appropriating $1,000 for repairs on Main st., Felix to Isadore, Fifth, Edmond to Sylvanie and Sixth, Olive to Monterey. Another measure provides for grades in alley between Felix and Edmond from 22d to 24th sts.

St. Louis, Mo.—Board of Public Improvements have set Sept. 5 as day of public hearings on improvements of large number of streets.

St. Louis, Mo.—The Board of Public Improvement recommended to the Municipal Assembly drafts of ordinances for the following street work: Reconstruction of wood blocks, Delmar boulevard from Taylor to King's Highway, $23,120; improvement, bitulithic, Highland ave. from Goodfellow to Hamilton, $9754; Clara ave. from Berlin to Kingsbury, $8,912; Northland ave., from King's Highway westward 1,441 ft., $16,825; brick, Hornsby ave. from Broadway to Church, $9,000; Hornsby ave. from Church to Newby, $6,200; Old Manchester road from January to Magnolia, $25,384; Clifton ave., from Magnolia to Columbia, $2,113; Parnell st., from Palm to Natural Bridge, $2,155; Cora ave., from Natural Bridge to Margaretta, $9,194; telford, Salzburger ave., from Loughborough northeastward 618 ft., $4,106; Tyrolean ave., from Salsburger to Gravois, $4,685.

Billings, Mont.—The following bids have been received for paving part of Minnesota ave.: James Kennedy, Fargo, N. D., $2.30 per sq. yd. of bitulithic; Warren Construction Co., Portland, Ore., $2.39 for bitulithic; Hanlan & Oates, Sioux City, $2.90 for creosoted block; Frank Savaresy, Billings, $3.33 for creosoted block.

Madison N. J.—For repairing of pavement on Main street and Madison avenue, to Fred Smith, of Morristown.

Ocean City, N. J.—Voters have decided to widen and pave Ninth st., from West ave. to the bay.

Perth Amboy, N. J.—Notice of intention to pave New Brunswick ave. with 6-inch concrete pavement and bituminous top is being published. Wilbur La Roe, City Clerk.

Woolwich, N. J.—Township has appropriated $3,000 for roads.

Albany, N. Y.—John N. Carlisle, commissioner of highways, has advertised for bids on 16 repair contracts to be opened at office of state commission of highways, 55 Lancaster street, Albany, at 1 p. m., Aug. 18. These contracts cover repair of 35 roads in 12 counties.

Albany, N. Y.—H. A. Rubinell, Counsel for the Warner Quinlan Asphalt Co., obtained from Supreme Court Justice Cochran of Kingston an injunction to restrain the commissioner to open 59 bids on contracts for highway construction and repairs. It is understood that the bids will be opened Aug. 5.

Geneseo, N. Y.—Meeting of taxpayers has been discussing the permanent improvement of streets. It was decided to raise $40,000 and begin work at once. The motion was made by James W. Wadsworth.

Lockport, N. Y.—Board of Supervisors has passed resolution to appropriate money for improvement of Telegraph road from village of Middleport to Orleans county line at total cost of $18,800, of which county pays 35 per cent. Board has also adopted resolutions approving petitions to improve Ridge road in Lewiston from road No. 617 east to westerly line of Cambria, Lake road in the towns of Newfane and Somerset and Canal road from Young's bridge to Millard's bridge, between Lockport and Gasport.

Newburgh, N. Y.—Bids are being advertised for repairing of five roads in Orange county.

North Tonawanda, N. Y.—Board of Public Works will complete plans for paving of Clinton and Morgan sts. this summer.

Rochester, N. Y.—Board of Contract and Supply will receive bids on improvement of various streets.

Rochester, N. Y.—Property owners on North Union st .are conferring with City Engineer Fisher and Commissioner of Public Works R. W. Pierce for the sewerage, paving and lighting of their street.

Raleigh, N. C.—Election will be held August 2 for voting on bond issue for public roads. J. A. Mills is chairman.

Dickinson, N. D.—Dunn County Commissioners have authorized expenditure of $1,000 on Dickinson-Manning road, and Surveyor Veigel is to have charge of the work.

Akron, O.—Resolutions to improve a number of streets are being published by G. C. Jackson, President of Council.

Cincinnati, O.—County Commissioners have approved survey of plans for improving Brower road at an estimated cost of $57,729.

Youngstown, O.—Bids will be received until 2 p. m., Aug. 11, 1913, at office of D. J. Jones, City Auditor, for purchase of following bonds: $5,000 for city's portion of street improvement; $1,920 for paving portion of Hogue st ; $1,425 for clearing of Wick ave.; $6,150 for paving portion of Fulton st., and $8,410 for paving portion of Ridge ave.

Youngstown, O.—Two blocks of city bonds have been disposed of at par by City Auditor. The Ina ave. paving bonds, amounting to $9,450, went to City Savings at par and Marion ave. paving for $8,110 to the Mahoning National Bank at par.

Isabel, Okla.—McCurtain county has voted to issue $30,000 for roads.

Jacksonville, Ore.—County of Jackson is considering issuing bonds for $700,000 for construction of roads and bridges.

Oregon City, Ore.—Bids are being received by county clerk of Clackamas county for macadamizing of Oregon City-Portland road, which will cost about $15,000.

Ebensburg, Pa.—Ebensburg Council has decided to pave Crawford st., from Center to Julian sts., distance of about a square.

Harrisburg, Pa.—Ordinance has been adopted for grading of 21st st., from Knox st. to Derry st. Chas. A. Miller is Clerk of Common Council. Ordinance has also been adopted for paving of Carrie alley, from Cameron to Tenth st.

Lehigh, Pa.—Borough has decided to pave its streets with brick.

Philadelphia, Pa.—Appropriation of $100,000 has been made by State for repairing of country roads.

Anderson, S. C.—City Engineer Shearer has completed tabulation of 70 bids for street paving. The names of the contractors are as follows: R. G. Lassiter, Greensboro, N. C.; Jamison & Hallowell, Montgomery, Ala.; Atlantic Bitulithic Co., Richmond, Va.; S. Monroe & Son Co., Portsmouth, O.; Porter & Boyd, Charlotte, N. C.; Lewis & Stafford, Augusta, Ga.; Continental Public Works Co., New York City; West Construction Co., Chattanooga, Tenn.; Southern Paving & Construction Co., Chattanooga, Tenn.; Hankerson & Hagler, Augusta, Ga.; Noll Construction Co., Spartansburg, S. C. The pavements for which bids were submitted include many kinds of bituminous pavements.

Chattanooga, Tenn.—Commission has been appointed by court of Hamilton county to construct the Lookout Mountain road, for which sum of $65,000 is available.

Red Boiling Springs, Tenn.—A meeting will be held at Red Boiling Springs, Macon County, in Aug. 2, for purpose of consummating plans for completion of automobile road between Nashville to that place. Road is practically completed from Nashville to LaFayette, distance of 60 miles, leaving only 12 miles to be built.

Augusta, Tex.—Preliminary work for paving of about ten blocks of West Sixth st., extending from West ave. to West Line will be completed within next few days.

Denison, Tex.—J. C. Field, consulting engineer of the Red River Bridge Co., is making plans for macadamized road 1½ miles long to cost $4,000 as approach to bridge over Red River.

Paris, Tex.—City Council has awarded contract to Waco firm for paving of Brown ave.

Asheville, Va.—Construction of good road from Yancey county line to connect with road which extends from Barnardsville to Asheville is being discussed.

Wheeling, W. Va.—Mayor Kirk has issued call for joint meeting of ordinance and finance committees of council to be held to consider and draw ordinance providing for bond election to pass $200,500 worth of street improvement bonds.

Olympia, Wash.—Gov. Ernest Lister has announced that work on all state highways will be rushed as rapidly as possible. This year about $300,000 of the $1,600,000 appropriated by the last legislature will be available for use.

Spokane, Wash.—Petition has been filed asking for paving of Broadway between Monroe and Post sts.

Spokane, Wash.—Commissioner of Public Works Hayden has filed report recommending that matter of improvement of Cleveland avenue from Belt to Hemlock street be placed on file.

CONTRACTS AWARDED.

Tuscaloosa, Ala.—By city, contract to Southern Asphalt Paving Co., Birmingham, Ala., for 10,000 yards of paving at $1.90 per sq. yd.

Birmingham, Ala.—For paving with brick 14th st. by City Comrs. to Alabama Paving Co. at $16,718.

Pine Bluff, Ark.—Shelby & Bateman, Little Rock, Ark., have been awarded contract for 22 miles Dolarway paving at a cost of $160,000.

Long Beach, Cal.—For constructing cement walk, curbs and gutters on Esther st. and Linden ave. to Ornamental Stone & Brick Co., of Long Beach, at $6,000.

Los Angeles, Cal.—Contract for paving Elden avenue from San Marino street to Pico with asphalt and brick has been awarded to Barber Asphalt Co. on its bid of $19,769. Two other bids were received, one from Fairchild-Gilmore-Wilton Co. for $20,270, and other from Ford & Stout for $20,760. Bids for paving Main street from Tenth to Jefferson with asphalt have been taken under advisement. There were two regular bids, Fairchild-Gilmore-Wilton Co., $97,308, and Ford & Stout, $105,086.

Sacramento, Cal.—McGilgray Construction Co. has been awarded contract for improving and draining D st. Clark & Henery Construction Co. has been awarded contract for asphaltic concrete macadam, etc., on S st.

San Jose, Cal.—Contract for construction of 3 miles oiled macadam on Hostetter road awarded to John F. Adams, San Jose, at $1.35 per cu. yd.

Santa Monica, Cal.—For constructing 6 miles asphalt pavement on W. Slauson ave. for R. D. List Co. has been awarded to Ford & Stout, Bradbury Bldg., Los Angeles, at about $125,000.

Hartford, Conn.—By Chas. J. Bennett, State Highway Comr., for road work as follows: 5,500 ft. gravel road in Canaan at $1.54 per lin. ft. to Jos. De Michiel & Bro., and 8,480 ft. macadam road in Avon to Robt. G. Miller, Bloomfield, at $1.84 per lin. ft.

Hartford, Conn.—Contracts for state road work have been awarded by Highway Commissioner as follows: Town of Groton, about 15,987 lin. ft. of native stone macadam construction, and graded construction the Groton-Mystic road and the Mystic-New London road to A. Vito Construction Corporation, Thompson, Conn., for approximately $26,574.75; Town of Chester, about 6,759 lin. ft. of macadam construction on the Chester road to A. Brazos & Sons, Middletown, Conn., for $2.89 per lin. ft. for macadam, $3.79 per lin. ft. for macadam over telford. Town of Sharon, 11,737 ft. of macadam to W. J. Mertz, Port Chester, N. Y., at $2.15 for a lin. ft. on the Millerton road.

Dunnellon, Fla.—By city contract to Alabama Paving Co., Birmingham, Ala., for two miles of brick-paved streets to cost about $100,000.

Belvidere, Ill.—Board of Local Improvements, consisting of Mayor McInnes, City Engineer Marean and Supt. of Streets Kennedy, has opened bids for Whitney st. paving job. John Fair was only bidder and he put in two bids. One was for $15,093.75, Bermudez asphalt to be used. Other specified Pioneer Company asphalt, and that was for $14,500. Estimates for the job are $14,800. It is estimated that there will be about 5,140 lin. ft. of combined curb and gutter and 10,025 sq. yds. of asphalt macadam. No action has been taken by the board.

Glencoe, Ill.—For paving Railroad and Milton aves. with brick by Village Council to Wm. J. Walter, of Glencoe, at $15,239.

Peoria, Ill.—For paving Easton Ave., from Hayes to Starr streets, to Canterbury Bros., at $5,655.

Peoria, Ill.—By board of local improvements, contract for wood block pavement on South Adams street to A. D. Thompson Co. at $30,981. L. D. Jeffries is City Engr.

Springfield, Ill.—For paving with brick 3 blocks on Cook st. awarded by Board Local Improvements to Richard Egan, Springfield, at $1.59½ per sq. yd.

Connorsville, Ind.—For paving twelve streets with cement to Wm. Coin, of Frankfort, at about $48,000.

Bloomfield, Ia.—Contract for 5,000 sq. yds. asphaltic concrete pavement awarded to the Western Improvement Co. at $1.59 per sq. yd.

Shenandoah, Ia.—Contract for 25,000 sq. yds. asphaltic concrete pavement has been awarded to Ford Paving Co., Cedar Rapids, at $1.72½ per sq. yd.

Arkansas City, Kan.—To Downard Asphalt Co., Ardmore, Okla., 26 blocks rock asphalt at $1.39, including excavation. Also 4,000 ft. curb at 30 cts. to Alexander Livingston. S. K. Titus, City Engr.

Louisville, Ky.—Contracts for construction of concrete sidewalks in various parts of city have been awarded to American Concrete Co.

Paducah, Ky.—By board of public works, contract at $3,704.20 to G. W. Katterjohn for concrete sidewalks on portions of Trimble, 21st, 24th and Mildred streets, and at $12,343.62 for concrete sidewalks on 4th street from Kentucky avenue to Norton street.

Bangor, Me.—Contract has been awarded for wood block pavement on Exchange st. to John Grady & Son, Bangor, at $3.39 per sq. yd.

Milton, Mass.—Proposals for building section of highway in Milton have been received by Highway Commission and sent to Selectmen. Three bids were submitted as follows: Patrick T. Donovan, of Roxbury, $26,184; John J. Martin, of Watertown, $10,135; the Jeremiah J. McCarthy Co., of Dorchester, $9,032. Contract has been awarded last named concern.

Marshall, Mich.—By Council, paving and sewer contracts to Globe Construction Co., of Kalamazoo. Bid for sewers was $13,516.40, and for asphalt concrete pavement $27,440.44 for 30 ft. streets.

Montevideo, Minn.—Bids will be received until Aug. 18 by A. M. Parks, City Clerk, for constructing a concrete foot bridge over Chippewa River.

Rochester, Minn.—By City Council for paving as follows: 3,537 sq. yds. wood block on E. College st. to General Contracting Co., 445 Temple Court, at $2.29 per sq. yd., and with asphaltic concrete, in all about 15,456 sq. yds., on W. College, Dakotah and Genesee Sts to Fielding & Shepley Co., of St. Paul, at $1.69 per sq. yd.

St. Paul, Minn.—Contract for grading of Palace st., from Syndicate to Hamline ave., to Christ Johnson at $640.

St. Joseph, Mo.—Board has opened bids for grading of 22d st., Massanie to Olive, and found that J. F. Buis, who bid 39 cts. per cu. yd. was low bidder.

Sikeston, Mo.—By city council, contract for paving and curbing to Murray Construction Co., Sikeston, Mo., at $13,448. Meyers & Thomas bid $14,544.

Butte, Mont.—By City Council for paving West Park st. with vitrified brick to Guimont Construction Co. at $4.34 per cu. yd.

New Brunswick, N. J.—Thos. H. Riddle has been awarded contract for 19,000 sq. yds. Dolarway paving.

Roselle, N. J.—Mathew Wade, Elizabeth, submitted lowest bid for grading several streets. His price was $1,424.

Westfield, N. J.—Lowest bid for paving of East Broad street has been submitted by the Weldon Contracting Co. Bids were received as follows: For concrete pavement, Burke & Bonhan, Plainfield, $33,762.41; Hassan Paving Co., $32,914.77; C. H. Winans Co., $33,997.88; Alfred Price, Ridgefield Park, $30,895.65; Straub & Billow, Mamaroneck, $31,115.81; Kramer Brothers, Paterson, $33,263.42; Schneider & Stelle, New Brunswick, $30,735.40; Liddle & Pfeiffer, Perth Amboy, $35,399.93; Weldon Contracting Co., $29,148.45; Bamberger & Chapman Co., $33,603.85. Bids for concrete pavement with bituminous top were as follows: Burke & Bonham, $32,480.08; Hassan Paving Co., $34,609.27; C. H. Winans Co., $33,207.30; Alfred Price, $36,881.67; Schneider & Stelle, $31,526.38; and Weldon Contracting Co., $28,960.15.

Albany, N. Y.—Lowest bids received by State Comr. of Highways, 55 Lancaster st. (R. K. Fuller, Secy.), July 28, for improvement of highways (John N. Carlisle, State Highway Comr.), are as follows: Road No. 1061, Dunkirk City, Chautauqua County, 0.59 mile, Constantine Constr. Co., Buffalo, $17,010; Road No. 1114, Millbrook Village, Dutchess County, 3.01 miles, Richard P. Stanton, Millbrook, $42,000; Road No. 1063, Tonawanda City, Niagara and Ellicott sts., Erie County, 2.25 miles, John Johnson Constr. Co., Buffalo, $56,710; Road No. 1065, Alden Village, Erie County, 1.66 miles, C. E. Aldrich, Rochester, $37,793; Road No. 1097, Churchville-Bergen, Genesee County, 0.44 mile, Whitmore, Rauber & Vicinnus, Rochester, $8,610; F. J. Munn Constr. Co., Buffalo, $10,087; Road No. 1085, Lockport City, South Transit st., Niagara County, 0.97 mile, McGuire & Fahey, Hornell, $41,997; Road No. 1086, Lockport City, West ave., Niagara County, 0.69 mile, Barney & Ingersoll, Rochester, $37,094; Road No. 1107, Oriskany Falls Village, Oneida County, 0.22 mils, Valley Constr. Co., Sidney, $2,755; Road No. 1043, Fabius Village, Onondaga County, 1.31 miles, Chas. O. McComb, Syracuse, $16,193; Road No. 1069, Onondaga Valley, Onondaga County, 0.32 mile, Greenfield Constr. Co., Hornell, $3,685; Road No. 1070, Vesper-Tully, Onondaga County, 1.68 miles, Greenfield Constr. Co., Hornell, $18,168; Road No. 1071, Amber Hamlet, Onondaga County, 1.99 miles, John Johnson Constr. Co., Buffalo, $23,620; Road No. 5386, Canandaigua Village, West ave., Ontario County, 0.91 mile, Aikenhead, Bailey & Donaldson, Rochester, $21,592; Road No. 5387, Peekskill-Fishkill, Pt. 2, Putnam County, 2.38 miles, John F. Donovan, Saugerties, $30,954; Road No. 1108, Potsdam Village, St. Lawrence County, 2.19 miles, Richard Hopkins, Troy, $28,462; Road No. 1080, Hudson Falls Village, Washington County, 0.97 mile, W. L. Lawton, Glens Falls, $7,598.

Albany, N. Y.—Syracuse contractors were among those who submitted bids to-day for improvement of 16 highways. The firms which sent in bids were: For Road No. 1033, Fabius village, 1.31 miles, Frank S. Sparto, $19,955.65, and Charles O. McComb, $16,193.37, which was the lowest. For Road No. 1069, Onondage Valley, 0.32 mile, Gafney & Burns, $4,741.75. The lowest bid was submitted by the Greenfield Construction Co., Hornell, $3,685.30. Road No. 1070, Yesper-Tully, 1.86 miles, J. H. Weldman, $18,409.25; Charles O. McComb, $19,243.35. The lowest bid was that of the Greenfield Construction Co., $18,168.40. Road No. 1071, Amber-Hamlet, 1.99 miles, J. H. Weldman, $25,746.50; Kirk & Rawlin Co., $24,791.58. The lowest bid was that of John Johnson Construction Co., of Buffalo, $23,670.80. Roger B. Kennedy, Utica, was lowest bidder at $33,756.40 for work on road No. 1108, Potsdam Village, St. Lawrence county.

Albany, N. Y.—Good roads contractors from Buffalo were low on several repair contracts. The contractors were: Constantine Construction Co., Road No. 1061, Dunkirk, $17,010.25; John Johnson Construction Co., Road No. 1065, Alden, $38,204.24; Road No. 1971, Amber Hamlet, $23,620.80, and Road No. 1063, Tonawanda City, Niagara and Ellicott sts., $56,710; McGuire & Fahey, of Hornell, were the lowest bidders on Road No. 1085, Lockport City, South Transit st, $41,997.50; Barley & Ingersoll, of Rochester, submitted the lowest bid for work on Road No. 1086, Lockport City, West ave., $37,094.50.

Canandaigua, N. Y.—Construction of new state highway pavement, entire length of West ave., this city, will probably be performed by Aikenhead, Bailey & Donaldson, of Rochester, at $21,502.90.

Fort Edward, N. Y.—Contract has been awarded Holler & Shepard for 931 sq. yds. Dolarway paving.

Pulaski, N. Y.—Contract for constructing an arched concrete bridge reinforced with steel across the highway at Salina st. has been awarded to Geo. E. Card, of Watertown.

Rome, N. Y.—President T. J. Mowry has been authorized to sign a contract to Warren Brothers for bitulithic pavement on Maple and Elm sts.

Rochester, N. Y.—Contracts for paving has been awarded as follows: Furnace st., asphalt pavement, Rochester Vulcanite Paving Co., $3,782.50; Stoke st., asphalt pavement, Whitmore, Rauber & Vicinus, $6,530; Farbridge st., brick pavement, Henry Schoenfeldt, $4,415; Rugby ave., asphalt pavement, Rochester, Vulcanite Paving Co., $1,504.

Rochester, N. Y.—By Board of Contract and Supply two paving contracts. The contract for asphalt pavement in Parkview was awarded to Rochester Vulcanite Paving Co. for $4,224. Roch-

ester Vulcanite Paving Co. also was awarded contract for asphalt paving in Seneca Parkway for $3,454.50.

Waynesville, N. C.—By city, contract to Manley & Co., at about $3,000 for construction of 4,000 square yards of concrete sidewalks. J. N. Schoolbred is engineer.

Ponca City, Okla.—To H. L. Miles, Wichita, Kan., for 4,150 cu. yds. excavation; 14,500 sq. yds. brick; 866 sq. yds. macadam: 25 sq. yds. concrete; 5,495 lin. ft. curb and gutter; 924 lin. ft. headers; crossing plates, 54. Prices bid by Miles were as follows: Improvement E, brick paving, $2.03 per sq. yd.; excavation, 45 cts. per cu. yd.; curb and gutter, 52 cts. per lin. ft.; crossing plates (cast iron 48 x28x½-in.), $5.85 each. Improvement F, brick paving, $1.96 per sq. yd.; excavation, 43 cts. per cu. yd.; curb and gutter, 52 cts. per lin. ft.; crossing plates, $5.85 each; macadam paving, $1.08 per sq. yd.; excavation, 42 cts. per cu. yd.; curb and gutter, 52 cts. per lin. ft.. Improvement G, brick paving, $2.03 per sq. yd.; excavation, 43 cts. per cu. yd.; concrete pavement, $1.11 per sq. yd.; excavation, 43 cts. per cu. yd.; extra work cost plus 10 per cent. All headers included in cost of paving; using asphalt filler in all work. Other bidders were J. F. Rankin, Ponca City, Swarticke & Parker, Oklahoma City, Dudley Construction Co., Stillwater. S. K. Titus, Paving Engr.

Coquille, Ore.—To C. B. Paving & Construction Co., Coquille, at $12,373, contract for grading, curbing and laying sidewalks.

Eugene, Ore.—For paving of Charnelton st., to Clark & Henery Co., at $17,-386.19.

Milwaukee, Ore.—For paving of Front st. with asphalt by City Council to Montague-O'Reilly Co., Portland, at $40,000.

Chester, Pa.—Following contracts have been awarded as follows: Union Paving Co.: Second st., Lamokin run to Thurlow st., 21,085 sq. yds., at $1.86 per sq. yd. Second st., Penn to Fulton st., 4,350 sq. yds., at $1.92 per sq. yd. Third st., Thurlow st. to city line on the west, 6,544 sq. yds., at $1.92 persq. yd. Third st., Concord ave. to Market st., 4,785 sq. yds., at $1.87 per sq. yd. Seventh st., Madison to Butler st., 18,000 sq. yds., at $1 86 per sq. yd. East side of Market st., Graham to Front st., 856 sq. yds., at $1 98 per sq. yd. To Continental Public Works Co.: Concord ave., Third to Ninth st., 10,300 sq. yds., at $1.76 per sq. yd. Fourteenth st., Edgemont ave. to city line on the west. 2,800 sq. yds., at $1.80 per sq. yd. Butler st., Fifth st. to Ninth st., 5,150 sq. yds., at $1.85 per sq. yd. Twenty-third st., from Edgemont ave. to 230 ft. west of Crozer st., 5,150 sq. yds., at $1.61 per sq. yd. Engle st., Delaware ave. to Ninth st., 13,580 sq. yds., at $1.87 per sq. yd.

Norristown, Pa.—For rebuilding Germantown Pike to Wilauer & Co., Pottstown, Pa., at $16,400.

Warren. Pa.—For construction of about 33,000 sq. yds. of paving to L. A. Coats & Co., Warren.

Warren, Pa.—S. A. Coates & Co. have been awarded contract for 830 sq. yds. Dolarway paving.

Denton, Tex.—Street paving contract for square and main street at Pilot Point has been awarded to O. E. Cobb for $18,-000. Contract includes curbs and gutters of concrete.

Knoxville, Tenn.—The Mann Construction Co., Knoxville, has been awarded contract for $500,000 worth of road work in Greene county. The first $200,000 will be macadamizing roads already graded. This is the largest road contract ever let in East Tennessee.

Pilot Point, Tex.—By city, contract at $18,000 to O. E. Cobb for street paving.

Seattle, Wash.—To Stanley & Blair at $10,932, contract by board of county commissioners of King county, for construction of Redmond-Snoqualmie road. Other bidders were: George A. Bendert, $22,-999; Andrew Peterson, $24,415; Union Contracting Co., $20,964.

Seattle, Wash.—P. P. McHugh Paving & Construction Co. has been awarded contract for asphalt concrete and brick gutters for $49,047.

Burlington, Wis.—Cascade Construction Co., Seattle, Wash., has been awarded contract for 15,260 sq. yds. Dolarway paving.

SEWERAGE

Birmingham, Ala.—Ordinances have been approved for the construction of certain sanitary sewer.

Los Angeles, Cal.—Board of Public Works will request City Council to make appropriation for constructing temporary drainage system across Booklyn ave. and adjacent territory. Permanent system at estimated cost of about $300,000 will have to be constructed.

Ordway, Col.—An extensive sewer system for Ordway is an assured fact. Town Board has adopted ordinance providing for system that will take in all residence districts and business part of town. The plans for system have been drawn up, George H. Sethman, of Denver, being the consulting engineer. Sewer system will take in all the principal streets and will be constructed at maximum cost of $19,500.

Tampa, Fla.—The plans are completed and specifications have been delivered to the Board of Public Works of the city of Tampa for constructing the new $500,000 sewerage system, having a daily capacity for handling 15,000,000 gallons. The plant will be so arranged that this capacity may be doubled as soon as the needs of the city require it. Twombley & Henney, Engineers, 55 Liberty st., New York, are the consulting and designing engineers for the work. About 60 miles of vitrified tile sewers will be constructed and provided with connections for each lot on the streets in which laid.

Albany, Ga.—City has voted $25,000 for improvements to sewer system. H. A. Traver is mayor.

Dixon, Ill.—City council has authorized construction of sewers in 6th, 7th and East Chamberlain streets, and in Ottawa and North Galena avenues.

Council Bluffs, Ia.—A sewer will be laid on Ave. A, and the contemplated paving postponed probably until next year.

Creston, Ia.—Resolutions have been adopted for sewer improvements as follows: 3,570 lin. ft. of 15-in. pipe; 5,306 lin. ft. of 12-in. pipe; 810 lin. ft. of 10-in. pipe; 900 lin. ft. of 8-in. pipe and 420 ft. of 6-in. pipe. Theo. S. De Day, city engineer.

St. Joseph, Mo.—City engineer has been instructed to prepare ordinance for district sewer in vicinity of 27th and 28th sts., south of Jule.

Jersey City, N. J.—The Board of Commissioners have voted to raise $25,000 as an emergency appropriation to clean the sewers of that city. Mayor Fagan states that the capacity of many sewers have been reduced to one-fifth.

Jersey City, N. J.—Bids for construction of sewer at cost of about $70 000 to relieve pressure on Wayne, Mercer and Montgomery streets sewer and prevent flooding of large portion of Fifth Ward with each heavy rain storm will be advertised for within few days.

Perth Amboy, N. J.—The Gordon st. sewer is to be extended into the Sound, similar to the Lewis st. sewer.

Trenton, N. J.—Question of engaging engineers to make a sanitary survey of the city is under consideration.

Trenton, N. J.—Ordinance has been passed to authorize construction of sewer No. 586, in Tilton alley, from Schenck street to Ingleton street, there to connect with Sewer No. 277.

Long Island City, N. Y.—Bids will soon be advertised for the largest trunk sewer in the United States. The new sewer is to be the outlet of the big system to drain the entire Corona section. First section will be one mile long and consists of two tubes, one 12 ft. 6 ins. and the other 11 ft. in diameter.

Lestershire, N. Y.—Petition is being circulated for Grand ave. sewer which would have to be paid jointly with the city of Binghampton.

Oneida, N. Y.—Plans prepared by City Engineer Joseph Kempner for sewage disposal plant are being considered. Estimated cost $40,000.

Schenectady, N. Y.—City Engineer Wooley may be ready to present plans and specifications for construction of 15-in. sub-trunk sewer to extend from sewage pumping station along bank of Mohawk river to Nott street. This sewer will take care of sewage from short streets in Nott street and American Locomotive Co. section, which will not be taken by large intercepting sewer.

Akron, O.—Authorization by state board of health for Akron to go ahead with its plans for sewage and garbage disposal plants has been received.

Marion, O.—Construction of new sewage disposal plant on higher elevation has been ordered.

Erie, Pa.—H. J. Knapper has introduced an ordinance for constructing a 9-inch sewer in 22nd st.

Farrell, Pa.—Plans for sewage disposal plant and system will be completed in a few days.

McKeesport, Pa.—Petition has been presented for construction of 12-inch terra cotta sewer in Columbia ave. to Ridge ave.

Williamsport, Pa.—Bids have been received for construction of six sewers, but as they were all above appropriations for the work, contracts have not yet been awarded. Following are bids of each contractor and sewers bid on by them: Church st. storm sewer from William to Penn, Busch & Stewart, $17,-696.99; Charles Dugan, $15,452.30; George W. Rockwell, $17,402.65; J. Shadle, $16,-265. Erie ave. and Race st. storm sewer: Busch & Stewart, $1,224.95; C. Dugan, $851.55; J. McCadden, $840.30; Shadle, $931.47; J. Scharde, $931.70. The appropriation for this sewer is $400. Hepburn st. house sewer, Busch & Stewart, $239.70; C. Dugan, $199; J. McCadden, $171.50; John Shadle, $190.70; J. Schrade, $204.75; appropriation, $175. Brandon pl. house sewer: Busch & Stewart, $289.20; Charles Dugan, $225.50; J. McCadden, $205.34; Shadle, $218.24; Schrade, $238.20. Appropriation, $200. Erie ave. storm sewer: Busch & Stewart, $7,376.90; C. Dugan, $5,278.40; J. Schrade, $5,164.50. Mr. Schrade bid $40 on the outlet walls and Busch & Stewart, $47. M . Dugan failed to bid on these walls. The appropriation is $5,000.

Childress, Tex.—City is considering bond issue of $15,000 for sewer and street improvements.

Waco, Tex.—It has been decided to spend $5,000 in making sewer survey. Eanitary Commissioner J. A. Littlefield believes local sewage disposal plant will cost between $200,000 and $250,000. Bonds will be used to pay for construction of same.

Huntfington, W. Va.—City commissioners will ask bids immediately for laying trunk sewers in various parts of city. Bonds for $200,000 have been voted. A. B. Maupin is city engineer.

CONTRACTS AWARDED.

Pasadena, Cal.—New plan for outfall sewer has been suggested by C. D. Crouch, who plans to take over and build all main trunk lines and outfall sewer, septic tank, etc., and take bonds of various cities for pay. In addition he contemplates putting up special plant for obtaining by-products. This he will erect at his own expense. He will have full right to use effluent for irrigation purposes and is planning to serve 22,000 acres in the LaHabra Valley with irrigation water obtained through this plant. It is estimated that outfall sewer, as originally planned, would cost $2,500,000. Mr. Crouch estimates cost of his plan at $1,500,000. Board of Public Works has awarded contract to Mr. Crouch.

San Francisco, Cal.—By Bd. of Pub. Works to Karl Ehrhardt for sewer on Railroad ave. and Kentucky st., from Islais Creek south, at $24,734; also to Edw. Malley for regrading and sewer work in Chestnut and Poly sts., at $8,717.

Council Bluffs, Ia.—For repair of the Broadway settling basins awarded to E. A. Wickham & Co., of Council Bluffs, at about $5,000.

Odelbolt, Ia.—For constructing sewer system and septic tank from plans of E. E. Carlson, of Battle Creek, awarded to M. A. Camery, of Harlan, at $19,054. Other bidders: Lytle Construction Co., Sioux City, $21.788; M. McElligot, Evanston, Ill., $23,870; Black Hawk Construction Co., Waterloo, Ia., $20,020, and A. A. Dobson, Lincoln, Neb., $21,571.

Fort Scott, Kan.—Bids for work of covering storm sewers and culverts have been opened and bid of Midland Construction Co. accepted at $8.20 per cu. yd.

Kalamazoo, Mich.—Contract for building Leonidas, Mendon and Little Portage drain has been let by Drain Commissioner D. C. Thompson and St. Joseph County officials to D. E. Wedge, of Coldwater. Contract price was $32,000. Drain will be more than 12 miles long and extend from St. Joseph River, at Mendon through Wakeshma Township, to within one mile of Fulton.

Marshall, Mich.—By Council, paving and surface water sewer contracts, to Globe Construction Co., of Kalamazoo. Their bid for sewers was $13,516.40, and for asphalt concrete pavement $27,440.44 for 30-ft. streets.

Crookston, Minn.—For State Farm sewer awarded by the State Board of Control to the Hussey Construction Co. at $16,000.

Fairmount, Minn.—For constructing 30 blocks of sewers awarded to J. W. Turner & Co., Des Moines, Ia., at $19,-746.

St. Paul, Minn.—Contracts for sewer construction have been let by Board of Public Works as follows: Capitol boulevard sewer, from Winter to Arch sts., P. J. Ryan, $767; Fulton st. sewer, James to Palace, Thornton Bros., $1,687; Walpole

st. sewer, Fairview ave. to Baldwin st., O'Neil & Preston, $1,170; Griggs st. sewer, Van Buren to Minnehaha st., Christ Johnson, $3,549.33; Burgess st. sewer, Dale to Como ave., Christ Johnson, $1,-781.80.

Stillwater, Minn.—For sewers awarded by City Council to Fraser & Danforth, of St. Paul, at about $25,000. Lewis W. Clarke, City Engr.

Newark, N. J.—Bids have been opened by Passaic Valley Sewerage Commission for construction of three additional subsections of main intercepting sewer in Newark and for one sub-section of branch intercepting sewer in Garfield. One of contracts upon which bids were received to-day called for building sewer through Hamburg pl., from point near Ave. L, to point near Berlin and Jabaz sts., about 1,600 ft. Low bidder was Degnow Contracting Co., New York, at $235,-800. Another contract was for similar construction work through Hamburg pl., from Ave. L southerly to point 300 ft. south of Central Railroad grade crossing. Low bidder was Fraser & Burchenal, New York, at $135,650. Third Newark contract was for sewer construction from point 300 ft. south of Central grade crossing, through Hamburg pl. and Doremus ave. to point 1,850 ft. north of Ave. R, about 1,700 ft. Low bidder was Culp Co., Brooklyn, at $164,845. Garfield contract called for sewer construction through Saddle River, from Cambridge ave. and Dundee drive to point near Outwater lane, about 6,800 ft. Low bidder was Union Building and Construction Co., Passaic, at $94,550.

New York, N. Y.—For constructing sanitary sewer in Manor road from Columbia street to Richmond turnpike by George Cromwell, president borough of Queens, to Joseph Johnson's Sons, West New Brighton at $22,519.

Rochester N. Y.—John Petrossie Co. has been awarded Norton st. sewer contract for $1,038.

Schenectady, N. Y.—For constructing sewage pumping station, to Pratt, Reed & Phillips, Watertown, at $224,584.

Port Clinton, O.—For constructing 2,-500 ft. 32 to 20-in. sewer to Rimelspach & Thoma, of Fremont, at $8,000.

Salem, O.—Bonds in sum of $25,000 for intercepting sewers have been awarded to A. E. Aub & Co., of Cincinnati.

Durant, Okla.—For furnishing material and constructing an extension to the sanitary sewer system from plans of the Benham Eng. Co., American Natl. Bank Bldg., Oklahoma City, has been awarded to the J. W. Stokes Constr. Co., Oklahoma City, at $33,058. Other bidders: J. S. Terry Constr. Co., Poteau, $35,158; Dalton & Campbell, Dallas, Tex., $35,119; J. E. Davis, Caddo, $33,474; Darr & Lucia, Oklahoma City, $34,062; N. S. Sherman Machine & Iron Works, Oklahoma City, $35,804; E. C. Baum, Durant, $38,571; Connelly Constr. Co., El Reno, $34,940; Reinhart & Donovan, Oklahoma City, $39,884; Hunter & Hunter, Oklahoma City, $36,510.

Watonga, Okla.—For constructing sanitary sewer system, to Derr & Lucia, Oklahoma City, Okla., at $28,622. Other bids as follows: E. M. Ely, Wellington, Kan., $31 184; N. S. Sherman Machine & Iron Works, Oklahoma City, Okla., $34,-956; Connelley Construction Co., El Reno, Okla., $32,180.

Eugene, Ore.—For construction of sewer on Fairmount boulevard, to Calver, Shasta & Walker, at $2,907.

Chattanooga, Tenn.—To Noll Construction Co., contract for sewer work in Tenth ward, bid being $20,457.08. Other bids entered were Isaac C. Mischler, $23,-140.10; Key-Arnold Construction Co., $23,772.07; McIsaac & Gentry Co., $24,-683.56, and the Smallwood-Howie Co., $27,659.25.

Welch, W. Va.—By city to John D. Schott, Bluefield, W. Va., at $31,755.64 for construction of sewers.

Colville, Wash.—For constructing sewer system to J. L. Wood, E. 1609 Sprague ave., Spokane, at $27,366. Other bidders: Rusch & LaPlant, Colville, $27,522; D. H. Kimple, Colville, $28,153; Parrott Bros., Baker, Ore., $29,767; P. L. Langan, Spokane, $27,529; G. Burgie, Spokane, $28,000; Washington Contr. Co., Spokane, $34,989. Grover G. Graham, City Clk.

Seattle, Wash.—Stephen Ciabaltoni has been awarded contract for sewer at $1,-765. A. Hambac Co., sewer at $1,840.

Milwaukee, Wis.—Michael Synowitz is low bidder for sewer in First ave., at about $77,500. Sewer is 5,120 ft. long, 16½ ft. maximum diameter.

WATER SUPPLY

Oakland, Cal.—Resolution has been adopted ordering opening of bids, Aug. 11, for construction of 4-in. water pipe on Hayward-San Leandro road, from corner of Sybil ave., to standpipe about 3,260 ft. southerly. Estimate of cost of the work by county surveyor is $2,000.

Oakville, Conn.—Construction of new reservoir is being discussed.

Denver, Colo.—Edwin Van Cise, President of Utilities Commission, has submitted to the city attorney, I. N. Stevens, a bonding ordinance providing for an $8,000,000 bond issue to be used in the construction of a municipal water system. It is proposed to take the water out of the Blue River to a 4-mile tunnel.

Washington, D. C.—At request of District Commissioners, the engineer officer in charge of District water supply system, Gen. Bixby, chief of engineers, has issued permit for Engineer Commissioner to lay nearly 900 ft. of 8-in. water main on Conduit road, between Ashby st. and Nebraska ave., for benefit of residents of that locality.

Jacksonville, Fla.—Sealed bids are invited for $45,000 bond issue shortly to be made by city for purchase and improvement of the water plant.

Lavonia, Ga.—City will vote on Aug. 23 on $40,000 bonds for waterworks improvement.

Punta Gorda, Ga.—City is considering plans made for waterworks improvements; pump and engines and protection tank will be installed.

Marion, Ind.—E. Hulley, Water Works Superintendent, will ask Council for appropriation for new main.

Des Moines, Ia.—Resolution has been passed by Valley Junction City Council authorizing purchase of entire waterworks system with exception of two dynamos, from Des Moines Electric Co. at purchase price of $10,000.

Westernport, Md.—Bonds for improvement of public water supply system will be offered for sale Aug. 12, amounting to $60,000.

Boston, Mass.—Mayor has submitted to Council order providing for transfer of $200,000 from water income for relaying of water mains in various sections as another fire protection measure.

Grand Rapids, Mich.—Bond issue of $25,000 has been voted in East Grand Rapids for water-works system.

Butler, N. J.—The Board of Public Utility Commissioners of Trenton, N. J., have directed the Butler Water Company to at once obtain an increased water supply and storage capacity. The Board has also directed the company to install meters on certain classes of services.

Gloucester City, N. J.—City Council will install air lift system for pumping water from wells at city pumping station.

Jersey City, N. J.—Director of Streets and Public Improvements James J. Ferris has decided to clean up Rockaway River, from which Jersey City secures its water supply.

Auburn, N. Y.—Auburn Water Board is considering installation of chemical plant to cost $5,000.

Boonville, N. Y.—Village Board is contemplating an additional reservoir for water system, to cost about $900.

Old Mill Landing, Long Island, N. Y.—Alderman Henry Grimm says that the water supply will be extended to the Landing in the near future. Residents will make a determined fight for paving a sandy road which runs for a mile and a half from Crescent ave. to the Landing pier.

Selma, N. C.—Plans are being prepared for improvements to water system. Estimated cost, $10,000. M. F. Nordan is Mayor.

Lakewood, O.—City Council is considering plans for construction of pumping station and filtration plant. Estimated cost, $150,000. J. B. Coffenberry is Mayor.

Youngstown, O.—Bids will be received until 2 p. m., Aug. 11, 1913, at office of D. J. Jones, City Auditor, for purchase of $110,000 of bonds for extending and improving water-works system.

Youngstown, O.—The Milton reservoir project will cost $751,000, according to estimates made by the city engineering and city legal departments. This is divided as follows: $500,000 for the dam, $20,000 for clearing the site, $141,000 for changing roads, building culverts and bridges and $90,000 for additional land yet to be purchased.

Youngstown, O.—Plans will be drawn for pumping station.

Portland, Ore.—Water bonds in sum of $75,000 will be sold Aug. 13.

Canton, Pa.—The plans prepared by Henry W. Taylor, Consulting Engineer, Albany, N. Y., for hypo-chlorite plans for the Citizens' Water Co. and for water supply improvements, including storage reservoir and filtration plant for Troy, Pa., have been approved by the Pennsylvania State Department of Health.

Coudersport, Pa.—Borough is in favor of municipal water system, and election will probably soon be called to vote on bond issue of $50,000.

Philadelphia, Pa.—Chief Davies, Bureau of Water, will soon ask for bids for new chimney at Torresdale. Sum of $83,000 will be spent for five miles of mains in northeast section.

Nashville, Tenn.—Purchase of water tower is strongly recommended.

Sparta, Tenn.—Several sets of drawings for new water works have been submitted for approval of Tennessee Inspection Bureau, and are being examined by H. B. Long, engineer for bureau. Greeneville and Erwin, Tenn., also contemplate installation of new water plants in near future.

Fort Worth, Tex.—City will begin laying water mains shortly to connect with Polytechnic as requested by residents of that suburb. Water mains already extend to vicinity of Polytechnic, and it will be necessary only to make connections and lay small pipes in street.

Quanah, Tex.—Citizens have voted to issue $20,000 water works bonds.

Ogden, Utah.—Taxpayers of Ogden will vote for or against issue of $75,000 water works department bonds to be used in building dam in South Fork Canyon in order to store sufficent water for dry months of July, August and September of each year.

Sale Lake City, Utah.—City Commission has passed resolution by commissioner of streets authorizing city recorder to advertise for bids on construction of Lake Phoebe dam and for excavating for Twin lakes dam.

Tacoma, Wash.—About 20 miles of large water mains will be laid in West End and around Fern Hill. Estimated cost, $100,000.

CONTRACTS AWARDED.

Tulare, Cal.—To Charles C. Moore & Co., at $6,395, for furnishing four centrifugal pumps for municipal pumping plant.

Hayden, Colo.—For constructing water works, awarded to J. C. Schwartz, Colorado Springs. The work includes cast iron mains, wood pipe flow line, masonry reservoir, intake from river, etc.

Milton, Fla.—Walton & Wagner, Augusta, Ga., have been awarded contracts for water works, sewerage and lighting plant at their bid of $36,415. Other bidders were as follows: Barkenville & Co., Birmingham, Ala., $42,000; Dysard Construction Co., $39,400; Walton & Wagner, Augusta, Ga., $36,415.77; C. H. Turner Construction Co., Pensacola, $43,525; Chas. A. Born, Pensacola, $42,525; Solomon, Long & Haggerty, $39.130.07.

Grayslake, Ill.—For sinking 12-in. tubular well and laying 8-in. water mains, to H. L. Thorne, Platteville, Wis.

Chanute, Kan.—To Pittsburgh Filter Co., of Pittsburgh, Pa., for construction of the filter plant, cost $15,000.

Hopkinsville, Ky.—For constructing concrete settling basin for Hopkinsville Water Co., to H. H. Brownell & Co., of that town.

Agawam, Mass.—Contract for furnishing cast iron pipe has been awarded by the Water Comrs. to the U. S. Cast Iron Pipe & Fdy. Co., N. Y. City, for 8-in. pipe, and to R. D. Wood & Co., of Philadelphia, Pa., for 6-in.

Longmeadow, Mass.—For furnishing and laying about 10,500 ft. of 8-in. and 15,600 ft. of 6-in. cast-iron water pipe, to Way & Cellilli, Springfield, Mass., at $21,926.

Olivet, Mich.—For construction of new water system to Fort Wayne Engineering & Mfg. Co., Fort Wayne, Ind., at $14,500.

Delano, Minn.—By Village Council, to W. D. Lovell, of Minneapolis, for water works extension, at $6,700.

Columbia, Mo.—For drilling a deep well, awarded to Perry L. Crossman & Co., Joplin, at $2 50 per ft.

Homer, Neb.—For constructing water works, to the Alamo Engine & Supply Co., of Omaha, at $7.228.

Fulton, N. Y.—Board of Public Works has accepted proposition of Laidlaw-Dunn-Gordon Co., of Buffalo, to furnish city with horizontal Corliss pump

of 75 pounds domestic pressure and 121 pounds fire pressure for use in city pumping station. Price will be $7,375. Edward Joy Co., of Syracuse, submitted bid of $9,150.

Schenectady, N. Y.—City of Schenectady and the Schenectady Illuminating Co. have come to agreement concerning improvement of city's water system. By terms of contract city is to pay at once bill of Illuminating Co. for 8,000,000-gallon I. P. Morris pump installed by this company at Rotterdam pumping station, and which cost $12,295, with interest at 6 per cent. from July 1, 1909. City agrees to pass necessary ordinances for construction of reservoir of not less than 10,000,000 gallons capacity on Bevis hill, or some other suitable location, and improve its water system by division of city into two-pressure system connected with reservoir as soon as possible, and to lay necessary mains. Company agrees to install two efficient and up-to-date turbine centrifugal high pressure pumps; to remove at its own cost two Worthington pumps now installed; at its own expense to put electrical equipment at plant in first-class operating condition. Upon completion of installation, material and equipment of two new high pressure pumps, city will pay company $25,200 in full settlement for work. If city decides to locate two 12,000,000-gallon high pressure pumps for high pressure district, company will install at actual cost to company any additional electrical apparatus required.

Raleigh, N. C.—For construction of concrete settling basin for water system, to Jacobs, Gibble Co., Durham, N. C., at $5,000.

Pierre, S. D.—Contract has been awarded Joseph Stainer for construction of concrete dam and bridge for improvements on Capitol ave. The contract calls for expenditure of over twelve thousand dollars.

Blairsville, Pa.—Contract for constructing a pump-triple expansion pumping engine has been awarded to the Epping-Carpenter Co., of Pittsburgh, at $3,-120. Hugh R. Wiley, Boro. Clk.

Polytechnic, Tex.—To A. P. Muller, of Dallas, for constructing a sewer system at $14,942.

Spur, Tex.—For constructing water works to E. A. Hammond, Dallas, at $16,-994, and to Clifford Jones, of Spur, for tank and tower, at $3,200.

Norfolk, Va.—By Board of Control, contract for several hundred meters of disc type, as follows: National Meter Co. (W. P. Obendorfer and Son, local agents), 114 4-inch Empire piston meters, $215 each; 2 to 6 3-inch piston meters; $110 each; 6 to 15 2-inch Empire piston meters, $66 each, and 6 to 15 1½-inch Empire piston meters, $46. Buffalo Meter Co., 10 to 20 1-inch disc meters, $12.55 each; 25 to 100, ¾-inch disc meters, $9.45 each; 375 to 800 ⅝-inch disc meters, $6.25 each.

LIGHTING AND POWER

Hartford, Conn.—Alderman Christ introduced resolution which was adopted postponing action on the proposed municipal lighting project until the September meeting.

Melbourne, Fla.—City has awarded franchise to E. H. Hale for installing electric lighting system.

South Jacksonville, Fla.—City has voted $65,000 in bonds for extension of light, water and sewer systems, also for paving.

Quincy, Ill.—People will be asked to vote on installation of Gamewell fire alarm system.

Des Moines, Ia.—Council has passed resolution calling for special city election, to be held Sept. 22, at which time franchise recently prepared by Des Moines Electric Co. will be submitted to voters of the city for their decision. Franchise gives Valley Junction same rates and service which are furnished to Des Moines.

Waterloo, Ia.—Steps are being taken to secure lighting facilities along Riverside driveway off Lafayette st.

Paducah, Ky.—Plans are contemplated by managers of municipal electric light plant for installation of additional equipment. J. O. Keebler is Supt.

Welsh, La.—City will shortly vote on bond issue to construct electric light plant and waterworks.

Taunton, Mass.—Manager of Municipal Lighting Plant has been authorized and directed to enlarge capacity of Municipal Lighting Plant by addition of suitable machinery, boiler and instruments appertaining thereto, in accordance with report of C. W. Whiting, Consulting Engineer. Estimated cost, $50,-000. E. A. Tellow is City Clerk.

Bay City, Mich.—Better street lighting is being discussed.

Kalamazoo, Mich.—Consulting Engineer Rutz has completed his estimate on cost of installing competitive ornamental systems and has turned report over to Chairman Farrell of commission.

Kalamazoo, Mich.—City Council has recommended the adoption of cluster lights.

Camden, N. J.—Councilman Littlehales has introduced a resolution to give the people of Camden another opportunity of voting on the question of establishing a municipal lighting plant.

Chatham, N. Y.—Construction of municipal electric light plant at Chatham is being considered.

Sandusky, O.—Question of issuing $200,000 of bonds for municipal lighting plant will be voted on.

Erie, Pa.—Conduit Expert A. P. Michaels has submitted specifications for proposed high tension conduits in State st., from Front to 18th st. Conduit plans provide for twenty-four ducts to be laid on both sides of State st., from Front to 18th. It is expected that cost of construction will run close to $50,000.

Aberdeen, Wash.—Construction of municipal electric light plant at the falls of Wishkah River is being urged by Light Committee.

Puyallup, Wash.—City will shortly readvertise for bids for electricity for street lighting purposes.

CONTRACTS AWARDED.

Brookline, Mass.—By Bd. of Selectmen, for 1,000, more or less, gas mantle street lights, to Welsbach Street Lighting Co., 6 Beacon St., Boston, at $25.50 per lamp.

Chelsea, Mass.—To the Watson Flag. Eng. Co., of N. Y. City, for electric distribution and street lighting system for the naval hospital, at $4,500.

Marquette, Mich.—Contract for installation of conduit and wiring system and furnishing lighting fixtures for the U. S. post office at Marquette has been awarded to the Strang Electric Co., 214 South Seventh st., Philadelphia, Pa., at $4,218.

Syracuse, N. Y.—For installation of electric lighting system at State Fair grounds, to Conduit Electric Co., Syracuse, at $17,089.

Mayville, N. D.—For additions to municipal waterworks and electric light plant, as follows: Power house, Boyd Constr. Co., St. Paul, Minn., $8,108; reinforced concrete stack, Concrete Metal Chimney Co., St. Louis, Mo., $1,435; boilers, engines, generators and pumps installed complete, Northwestern Electric Equipment Co., St. Paul, Minn., $19,383, and sewer and water connections, M. Barr, Mayville, N. D., $2,074.

Austin, Tex.—State Purchasing Agent J. R. Elliott has awarded contract to Westinghouse Lamp Corporation to furnish electric light globes to charitable and eleemosynary institutions under his department and penitentiary system.

FIRE EQUIPMENT

Pomona, Cal.—Fire apparatus bond election will be held Sept. 10.

San Francisco, Cal.—Board of Works has approved request of City Engineer that $3,000 be set aside by Supervisors for preparation of plans and specifications for central fire alarm station, which is to be constructed in Jefferson square, and for its equipment.

Wilmington, Del.—Purchase of automobile tractor has been authorized for Weccacoe Fire Company.

Champaign, Ill.—Bonds have been issued for purchase of motor fire apparatus.

Topeka, Kan.—City Commission will be asked to purchase motor ladder truck.

Portland, Me.—Purchase of fireboat is being considered.

Boston, Mass.—Mayor Fitzgerald has decided to establish a division in the fire department to inspect all business establishments for the purpose of learning whether they were equipped with sprinklers or other protective devices.

Concord, N. H.—Ordinance has been passed providing for expenditure of $6,000 for purchase of motor combination chemical and hose wagon. W. C. Green is Chief.

Elizabeth, N. J.—Councilman Hobbs, Chairman of the Fire Committee, has reported that it is important that immediate action be taken to supply two hose companies with additional hose.

Moorestown, N. J.—Special election will be held in Moorestown Town Hall, Aug. 9, to decide on appropriations for fire department. At annual meeting on May 31 it was decided to purchase a motor truck, but this election has since been declared illegal by courts.

Lestershire, N. Y.—Village Clerk W. C. Lewis has been authorized to advertise for bids for a steel fire escape for a fire station.

Syracuse, N. Y.—City is considering purchase of auto fire apparatus.

White Plains, N. Y.—Fire Commissioners have rejected bids received for erection of building for the Hope Engine Co.

Westchester, Pa.—Fire Committee will purchase for Flame Fire Company a $9,000 combination and chemical hose automobile.

Kingston, R. I.—Union Fire District of South Kingston is considering installation of fire alarm system.

Spokane, Wash.—Commissioner of Public Safety Coates will introduce emergency resolution for purchase of $3,205.50 worth of auto parts for construction of new automobile hose wagon and chemical engine for Lincoln Heights station. Auto will be built by members of fire department.

Fond du Lac, Wis.—Purchase of one piece of motor apparatus has been authorized. C. Doll is Chief.

CONTRACTS AWARDED.

Pittsburgh, Pa.—Contracts for motor driven fire apparatus has been awarded by Mayor McGee as follows: Combination chemical and hose wagons: Ten to the American-La France Company at $4,-500 each; five to the General Automobile Company at $5,250 each; one 75-foot aerial ladder truck, Knox tractor, to the Seagrave Company at $8,550; one 85-foot aerial truck, Knox tractor, at $8,-950; one automobile for the chief engineer, to the General Automobile Company at $3,550; two tractors to the General Automobile Company at $3,250 each.

Dallas, Tex.—By city, for furnishing two motor combination chemical and hose wagons, to American-La France Fire Engine Co., by I. E. Schmitz, Dallas branch, 6-cyl., $6,350 each. Other bids as follows: Seagrave Co., Columbus, O., 4-cyl., $5,162 for one, or $10,174 for both; Webb Co., Allentown, Pa., 6-cyl., 93 h.p., $6,500 each; Nott Fire Engine Co., Minneapolis, Minn., 6-cyl., $5,-750; Kissel Motor Co., Hartford, Wis., 6-cyl., $10,950 for both; White Co., Cleveland, O., 6-cyl., $6,450.

BRIDGES

Denver, Colo.—Ordinance authorizing issuance of bonds for construction of Colfax ave. viaduct will shortly be presented to City Council for passage.

Indianapolis, Ind.—Bids will be received until 10 a. m., Sept. 15, for purchase of Marion County bridge bonds in sum of $100,000. Wm. T. Patten, Auditor.

Sioux City, Ia.—City Council is planning construction of concrete bridge over Big Sioux River at Riverside.

Portland, Me.—The state and municipal authorities and the railroads interested have agreed on the construction of a bridge between Portland and South Portland to cost one million dollars.

Haverhill, Mass.—Essex County Commissioners have awarded contract for rebuilding Groveland bridge to the Boston Bridge Co. for $51,985. Only other bidder was United Construction Co., Albany, N. Y.

Tarboro, N. C.—Edgecombe county has voted $200,000 bonds for bridge and road construction.

Baker, Ore.—Plans are being prepared for construction of a steel bridge across Powder River to cost $5,000. L. R. Stockman is Engr.

Richland, Pa.—Bucks County Commissioners will rebuild California bridge.

York, Pa.—Bids for a number of bridges have been received from the following contractors: Nelson-Meredith Co., Luten Bridge Co., J. S. McIlvaine & Co., G. A. & F. M. Wagman, Samuel Arnold, Barnett & Stevens, Hartley-Zeigler Co., G. W. Ensminger, Ruhl & Bond, Drawbaugh & Quickel and Thomas Wolf.

Fort Worth, Tex.—Bids for construction of approaches to 12th st. bridge are to be asked for by Street Commissioner Grant.

Liberty, Tex.—Liberty County Commissioners are planning to erect bridge across Trinity river.

West Point, Wis.—Election will be held Aug. 12 to vote on $14,000 bonds for bridge across Wisconsin River at Prairie du Sac and $5,000 for the Merrimac bridge.